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Volume XXVII-No. 1 January, 1954

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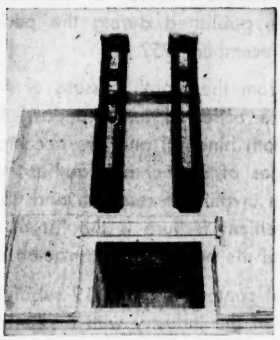

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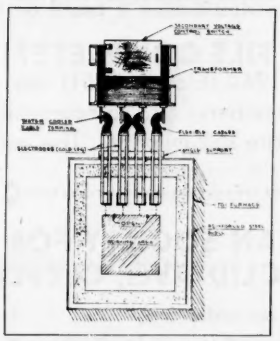
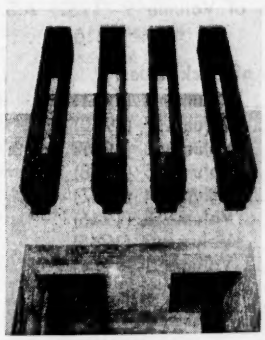


Drawing of HOLDEN TYPE 701-4 Submerged Electrode Furnace.



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Metals Review

THE NEWS DIGEST MAGAZINE • VOLUME XXVIII, No. 1 January, 1954

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Published monthly by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio: James B. Austin, President; George Roberts, Vice-President; W. A. Pennington, Treasurer; W. H. Eisenman, Secretary; H. B. Knowlton, A. O. Schaefer, G. M. Young, Robert Raudebaugh, Trustees; Ralph L. Wilson, Past President. Subscriptions $5.00 per year ($6.00 foreign). Single copies $1.00. Entered as Second Class Matter, July 26, 1930 at the Post Office at Cleveland, Ohio, under the Act of March 3, 1879.

Claims for missing numbers will not be allowed if received more than 60 days from date of issue. No claims allowed from subscribers in Central Europe, Asia or the Pacific islands other than Hawaii, or because of failure to notify the circulation department of a change of address or because copy is "missing from files".

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Joint Technical Societies Meeting Europe—June 1955

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A.S.M. Accepts Invitation of European Societies for a Joint Technical Meeting

The A.S.M. Board of Trustees at their meeting held in Cleveland during the annual Metal Congress and Exposition on Tuesday, Oct. 20, 1953, voted unanimously to accept the invitation of the European Technical Societies to participate with them in a joint meeting in Europe in June 1955.

The following is an outline of the proposals submitted in the letter of invitation and while some of them may be subject to revisions or additions, the general field of the Congress will probably follow closely the suggestions given below.

Participating in the Joint Technical Societies Meeting will be the following European Societies:

United Kingdom—The Iron and Steel Institute
—The Institute of Metals
France—The Societe Francaise de Metallurgie
Germany—The Verein Deutscher Eisenhuttenleute (acting also on behalf of the Deutsche Gesellschaft fur Metallkunde)
Sweden—Jernkontoret

The European Societies, which have authorized K. Headlam-Morely, secretary of the Iron and Steel Institute, to act on their behalf, have suggested that an appropriate date for such a meeting would be June 1 through 17, 1955.

The chief object of the Meeting will be to establish personal contacts between the experts in the different branches of metallurgy in the United States and Europe. This object could best be achieved, the Societies feel, by dividing the Meeting into a number of small groups, each group from the United States to be joined with a similar group from Europe. In this way groups of experts representative of opinion on both sides of the Atlantic can be set up. Procedure of this kind will ensure that the groups will be of manageable size, which is most desirable. Relatively small numbers of conferees in groups will greatly increase the opportunities for personal contact; traveling will be easier and more comfortable; there will be better opportunities for visiting European industries and of obtaining closer knowledge of the people in the various countries and their way of life. These factors are important for the better understanding and cooperation of all concerned.

Tentative suggestions for headings of each group and fields to be covered are as follows:

Iron and Steel

Ironmaking and raw materials (including coke and ore preparation, but excluding mining).
Steelmaking
Mechanical working (including hot and cold rolling, forging and wire drawing).
Surface treatment (including metallic coatings).
Steel properties and quality control (including heat treatment).

General

Education and training.
Research and development.

Nonferrous

Light metals.
Low-melting point metals.
Copper and copper alloys.
Precious metals and metals melting at high temperatures.

Subject to concurrence of the American Society for Metals, the Societies propose to omit certain clearly defined fields that are amply covered by existing international organizations, some of which are contemplating meetings in Europe during 1955.

The minimum time needed for a meeting of the kind proposed is between two and three weeks, and the period suggested as must suitable is the period covering the weekends of Sunday, June 1, through Sunday, June 17, 1955. It has been suggested that the Opening Plenary Session of the Meeting be held in London, that the center of the meeting around the second weekend be in Dusseldorf and that the meeting should conclude with a Final Plenary Session in Paris during the third weekend.

The exact date of the opening of the meeting must depend on shipping facilities, but it seems likely that it will be convenient that the Opening Session be held in London on the afternoon of Wednesday, June 1, or the morning of Thursday, June 2, 1955, and that about a week should be spent in Great Britain. If similar arrangements are made

in Germany and France, the official meeting could be concluded by a Plenary Session in Paris during the weekend around Sunday, June 19.

Realizing that many experts will find it difficult to spare much time, the Societies have tried to keep the program as short as possible. Absence from the United States need not exceed two or three weeks for those who travel by air, or one month for those who come by sea. However, in all these matters, the Societies would be guided by the views of what would be most convenient for their American visitors.

Visits to works and other places of scientific and technical interest in each of the countries visited would be arranged. In addition, visits would be arranged to other places of outstanding interest and social activities arranged. A program of interest to the ladies of the party would also be drawn up.

Within this general framework, the groups would have separate programs and, where necessary, separate itineraries. The principal meeting of each group would be arranged to take place in the country where the weight of technical interest makes this most suitable. Besides the meetings of the Plenary Sessions, a limited number of important technical papers should be presented and full opportunities provided for discussion within each group.

At the present time, the Societies have suggested that the main visits should be to England, Germany and France. Sweden will also be included, but it is thought better to decide later whether a visit to that country should be parallel to, or additional to, the other visits.

It is to be understood that visits to other countries can also be arranged. Other European countries have already indicated that they hope to have the privilege of welcoming American delegates to the Meeting. For the time being, it is thought better to leave these arrangements indefinite but later, when the wishes of those planning to attend the Meeting have been ascertained, the Societies will be happy to facilitate such visits, whether for technical or for holiday purposes. They have in mind, particularly, the possibility of small parties wishing to go to Switzerland, Austria and Italy, or Spain, or perhaps to Norway and other Scandinavian countries, or to Belgium and Holland. Some, who wish

to return to the countries in which the main meetings are to be held, can make plans in conjunction with the national metallurgical societies at the conclusion of the main meeting in Paris.

Should visitors wish to join other international meetings being held during the same summer, plans will be made to coordinate their programs to make this generally convenient.

A committee of representatives of the Societies issing this invitation has been set up in Europe. They will formalize their part of the organization of this Meeting and will arrange a central point for communication between cooperating American and European societies.

The Committee of representatives will take responsibility for the program in Europe and will prepare proposals which will cover in detail all travel and other arrangements. The American societies would take the responsibility of getting members from the United States to Europe and return. In this way, it will be easy to establish the costs that will be involved so that participants can be informed at an early date the probable cost of the various itineraries.

In addition to the general arrangements for the Meeting, the Societies have stated that they would be particularly pleased if a number of leading industrialists and personalities of the American Society for Metals could visit them at the same time. If this proves possible, the Societies would see that the division of the meeting into groups, as planned, did not interfere with the interest or enjoyment of their visit, and on the contrary, it would be their intention to see to their personal entertainment by leading people in similar positions in Europe. They hope that the rest of these meetings would be mutually agreeable, and at the same time provide opportunities for informal discussion. There are many people in leading positions in all free European countries who will welcome an opportunity to reciprocate hospitality received on visits to this country.

TO A.S.M. Members: Many of you are looking forward with pleasure to more details about the Technical Societies Congress in Europe from June 1-17, 1955. If you wish to be immediately informed on additional plans as they develop for the technical program and the planned visits, then send your name to A.S.M. headquarters and request to be placed on the mailing list of "A.S.M. to Europe in '55".

A.S.M. Midwinter Meeting

Tentative Technical Program
Statler Hotel
Boston, March 4-5, 1954

Thursday, Mar. 4

2:00 p. m.

PHYSICAL METALLURGY

Solution and Precipitation of Aluminum Nitride in Relation to the Structure of Low Carbon Steels, by W. C. Leslie, R. L. Rickett, C. L. Dotson and C. S. Walton, Research Laboratory, U. S. Steel Corp.

Roles of Aluminum and Nitrogen in Graphitization, by E. J. Dulis and G. V. Smith, Research Laboratory, United States Steel Corp.

Effect of Grain Size and Carbon Content on the Low-Temperature Tensile Properties of High-Purity Fe:C Alloy, by R. L. Smith, Franklin Institute, and C. Spangler and R. M. Brick, Department of Metallurgical Engineering, University of Pennsylvania.

Effective Diameter of Solute Atoms in Interstitial Solid Solutions, by Rudolph Speiser and J. W. Spretnak, Associate Professors of Metallurgy, and W. J. Taylor, Ohio State University.

8:00 p. m.

HARDENABILITY

Alpha-Molybdenum Hot Work Die Steels, by R. B. Corbett, Research Engineer, J. A. Succop, Chief Metallurgical Engineer, and A. Feduska, Heppenstall Co.

Thermal Reproducibility of the End-Quench Test, by John Birtalan, R. G. Henley, Jr., and A. L. Christenson, Timken Roller Bearing Co.

Analysis of Hardenability Under Marquenching Conditions, by C. M. Carman, D. F. Armiento and Harold Markus, Metallurgists, Frankford Arsenal.

The Influence of Heat Treating Variables on the Martensite Transformation in SAE 1050 Steel, by M. R. Meyerson and S. J. Rosenberg, National Bureau of Standards.

Friday, Mar. 5

9:30 a. m.

MECHANICAL AND NONFERROUS

Effect of Grain Size on High-Temperature Fatigue Properties, by J. E. Breen and J. R. Lane, Naval Research Laboratory.

Mechanical Anisotropy in Copper, by W. A. Backofen, Assistant Professor, A. J. Shaler, Massachusetts Institute of Technology, and B. B. Hundy, Scientific Officer, British Iron and Steel Research Association.

Effect of Prestrain Histories on the Creep and Tensile Properties of Aluminum, by Oleg D. Sherby and Alfred Goldberg, Research Engineers, and John E. Dorn, University of California.

Effect of Dispersions of $CuAl_2$ on the Elevated Temperature Tensile Properties of Al-Cu Alloys, by C. D. Starr and R. B. Shaw, Research Engineers, and John E. Dorn, University of California.

2:00 p. m.

STAINLESS

The Formation of Sigma Phase in Types 309 and 310 Stainless Steel, by R. C. Frerichs and C. L. Clark, Metallurgical Department, Timken Roller Bearing Co.

Precipitation Hardening in Austenitic Chromium-Nickel Steels Containing High Carbon and Phosphorus, by A. G. Allten, J. G. Y. Chow and A. Simon, Research Laboratory, Crucible Steel Co. of America.

The Substitution of Manganese for Nickel in 16-25-6 Alloy, by Wells E. Ellis, Research Metallurgist and M. Fleischmann, Timken Roller Bearing Co.

Work Softening of 16-25-6 Alloy at Elevated Temperatures, by Douglas A. J. Millar, Instructor and John Wulff, Massachusetts Institute of Technology.

Thursday, Mar. 4

10:30 a. m.

PRODUCTION OF METAL AND REFRACTORY COMPOUNDS

(Beryllium Symposium)

Reduction to Metal:

Reduction of Beryllium Metal From Beryl by Way of the Fluoride, by Henry C. Kawecki, Kawecki Chemical Co.

Reduction of Beryllium Metal From Beryl by Way of the Sulphate, by C. W. Schwenzfeier, Jr., Brush Beryllium Co.

Fabrication of Beryllium by Powder Metallurgy, by W. W. Beaver, Brush Beryllium Co.

Beryllium Cermets and Ceramics:

Refractory Compounds and Cermets, by W. W. Beaver.

Beryllia as a Refractory, by J. T. White, Division of Research, Atomic Energy Commission.

2:00 p. m.

FABRICATION OF BERYLLIUM METAL

(Beryllium Symposium)

Mechanical Working Processes:

Extrusion of Beryllium, by P. Loewenstein, et. al., Massachusetts Institute of Technology.

Rolling, Forging and Similar Processes, by C. E. Lacy, Knolls Atomic Power Laboratory.

Machining:

General Machining Methods for Beryllium, by J. M. Case and E. R. Watkins, Carbide & Carbon Chemicals Co., Y-12, Oak Ridge.

Special Techniques in Machining Beryllium, by J. E. Cunningham, Oak Ridge National Laboratory.

Joining, by D. C. Martin, Battelle Memorial Institute.

Plating and Cladding, by J. T. Stacy, Battelle Memorial Institute.

Friday, Mar. 5

10:00 a. m.

PROPERTIES OF BERYLLIUM AND ITS ALLOYS

(Beryllium Symposium)

The Brittleness Problem:

A Review of the Problem, by A. R. Kaufmann, Massachusetts Institute of Technology.

Purity of Beryllium as Related to Brittleness, by P. Corzine, et. al., Massachusetts Institute of Technology.

Metallography of Beryllium, by M. C. Udy, Battelle Memorial Institute.

Corrosion of Beryllium in Liquid Metals, by R. F. Koenig, Knolls Atomic Power Laboratory.

Beryllium-Rich Alloys, by A. R. Kaufmann.

2:00 p. m.

BERYLLIUM'S ROLE IN MODERN INDUSTRY

(Beryllium Symposium)

Historical Notes on Sources and Uses of Beryllium, by R. F. Griffith, Rare & Precious Metals Branch, U. S. Bureau of Mines.

Health Hazards of Beryllium, by Merril Eisenbud, Health & Safety Division, Atomic Energy Commission.

Role of Beryllium in the Atomic Energy Program, by R. E. Pahler, Division of Engineering, Atomic Energy Commission.

Role of Beryllium in Industry, by N. W. Bass, Brush Beryllium Co.

A Year With the Junior Section of the Philadelphia Chapter

Above Is Shown Part of the Group Attending the First Meeting of the Junior Section of the Philadelphia Chapter. At right, from left, are: A M. Bounds, Philadelphia Chapter Chairman; Edmond Tyminski, who spoke on "Nondestructive Testing"; and E. A. Fleming, Crucible Steel Co. of America, Junior Chairman

Another "first" for the Philadelphia Chapter will have to be chalked up as a result of its Junior Section, organized at an informal meeting in December 1952, to appeal to the younger members, and particularly to those graduating from the A.S.M. Temple evening course in physical metallurgy. Beginning with the organization meeting, led by past-chairman Joe Jackson, the Junior Section has grown in numbers and in enthusiasm in a most unexpected fashion. The rapid and yet orderly growth is a tribute to the leadership of Mr. Jackson, chairman of the Junior Advisory Committee, and to the enthusiasm and interest shown by the officers of the Junior Section.

Among the many objectives of the formation of a Junior Section, the following appear to be the most important.

1. To provide a technical and social program of particular appeal to A.S.M. members up to the age of 34. The technical programs are to emphasize "How to Do" rather than "Why". Career planning and job advancement are emphasized and the social program is to be one calculated to appeal to the interests of younger people.

2. To encourage wider participation in Chapter affairs by younger members who otherwise would not participate or contribute for some years to come.

3. To foster closer relations with student A.S.M. groups and with the evening students in the Temple evening course in physical metallurgy.

4. To enlarge Chapter membership since most new members are young members.

5. To single out and train the future leadership of the Philadelphia Chapter.

The continued enthusiasm of the officers and executive committee of the Junior Section has already brought about many of the above objectives and the benefits to the Chapter as a whole have been abundantly evident over the past year.

The Junior Section held its first official meeting in February 1953. To start things off, Philadelphia Chairman A. M. Bounds appointed temporary officers (to serve until June 1953) and directors for the Junior Section. The directors consisted entirely of senior members of the Chapter who were appointed to the Junior Section Advisory Committee. Temporary officers were: E. A. Fleming, Crucible Steel Co. of America, chairman; E. F. Eiswerth, Superior Tube Co., vice-chairman; and J. Ballantyne, U. S. Steel Corp., secretary-treasurer. Mr. Ballantyne was replaced by L. Calzi at a future date, due to the fact it became impossible for him to attend and participate in Junior functions. In June 1953, new officers were installed for the 1953-54 session, including: W. Eberly, chairman and E. Eiswerth, vice-chairman. Mr. Calzi was renominated secretary-treasurer.

The Junior Section started out with five standing committees: Program, entertainment, membership, publicity and by-laws. Each of these committees has accomplished its primary objectives thus far and propose to continue to build the Junior Section into a valuable adjunct of the Philadelphia Chapter.

The first technical meeting of the Junior Section was in December 1952. A. O. Schaefer, Midvale Co., spoke on "Forgings I Have Known and Trends of Making Them", discussing developments in and manufacture of forgings.

The second meeting was addressed by Edmund Tyminski of the West-

(*Continued on p.* 10)

inghouse Gas Turbine Division. Mr. Tyminski, who joined the Junior Section the same evening, presented a discussion on "Practical Testing Applied for Industry". He covered all phases of nondestructive testing methods used at Westinghouse, including talks on Zyglo penetrants, supersonic and X-ray methods.

The third meeting, held in March, featured R. Shattuck, Edgcomb Steel Co., who presented a talk on "Various Types of Toolsteels and Their General Applications". He described the toolsteels and discussed when, why and where they could be applied. He also noted the economic considerations to be given to each particular application.

Mr. Crescenti and Mr. Wiggins of the Liquid Carbonic Corp. also presented discussions at the March meeting. Mr. Crescenti discussed "Advantages and Disadvantages of CO_2 as a Coolant for Machining", and Mr. Wiggins showed slides and cited "Typical Applications of CO_2 as a Coolant".

The fourth technical meeting, held in April, featured J. I. Wexlin, district sales manager of the Bausch & Lomb Co., who spoke on "Photomicrography in the Metallurgical Laboratory". He covered the field from the earliest German microscopes to the research metallographs of today, with their complex sets of apochromatic lenses and sensitive focusing and light-gathering devices.

The final meeting of the first season of the Junior Section was a joint meeting of the Junior and Senior Groups of the Chapter, "Student Night", which is to be an annual event for the Chapter. Professor Bradley Stoughton, former dean and head of the department of metallurgy at Lehigh University, presented a talk on "Some New Alloy Steels and Their Properties". Senior Chairman Bounds presented Prof. Stoughton with a plaque after the talk in recognition of his work among the undergraduate students of metallurgy.

Forty-three couples attended the first Junior-Dinner Dance, held in June.—**Reported by A. M. Bounds and Robert Straub for the Philadelphia Chapter.**

Presents Discussion on Cancer at Akron Meeting

Speaker: Harold P. Brown

B. F. Goodrich Co.

The December meeting of the Akron Chapter was designated as Ladies Night. The coffee speaker of the evening, C. V. Staller, an engineer for the Rockwell Manufacturing Co., gave a talk on Czechoslovakia, which had once been his home.

Harold P. Brown, research scientist in polymerization research for the B. F. Goodrich Co.'s Research Center, gave a talk on "Cancer and Our Environment."

Mr. Brown, a native of Granby, Mo., received his A.B. and B.Sc. degrees from Central Missouri State College, his M.A. degree in chemistry from the University of Missouri, and his Ph.D. in organic chemistry from the University of Nebraska in 1933. He taught at the University of Kansas City in the chemistry department from 1933 to 1942, when he joined the staff at Goodrich.—**Reported by Richard E. Miller for the Akron Chapter.**

What's New in Materials Topic At Philadelphia

Speaker: T. C. DuMond

Editor, Materials and Methods

T. C. Du Mond, editor, *Materials and Methods* reported on "What's New in Engineering Materials", at a meeting of the Philadelphia Chapter.

Although there has not been much change in the material, advances in their use have been made.

In some applications where the ideal material may be known, supply is short, as is the case of the high alloys. We depend on other countries for 21 elements, 7 of which are not found in the Western Hemisphere.

The aircraft industry has been the leader in the trend to produce at lowest cost. With high wages and building costs, the use of material has become most important. Choice of material as well as methods of fabrication must be considered. Choice of proper material remains a complex problem. Even though we indiscriminately used the alloy steels during the war, plain carbon steel still finds many applications.

Rapid strides have been made in hot and cold extrusion methods of fabrication. The utilization of this method has decreased fabrication costs by 2/3, and has cut down on scrap loss. The use of coated and clad surfaces has been finding wide acceptance because of reduction in the total cost and protection from corrosion they provide.

The ceramic coatings, in spite of their few shortcomings, have proven highly successful. The Armour Research Institute has developed a coating, useful up to 3000° F., with low porosity, which can be easily applied. A well-known use is for jet engine parts, but it has been found that fixtures of Type-1330 stainless, when coated, have extended service life.

Plastics have made a showing in the metals industry. Many pipe producers are manufacturing plastic pipe and plastic car bodies have already been placed in production. The foam plastics, of phenolic base, are useful because of their buoyancy, strength, rigidity, low density and sound-deadening properties.

Nylon, or rigid vinyl, is being used extensively in bearings and gears. When mixed with other nonmetallics, several properties are possible, including conductivity and corrosion resistance.

T. C. DuMond (Left), Who Spoke on "What's New in Materials" at a Meeting of the Philadelphia Chapter, Is Shown Being Congratulated by Dave Schmid, Chapter Chairman

Silicones, while first used because they would not stick, are presently being used in adhesives.

Transistors, previously made of expensive germanium, can be made cheaply with the silicones, with a reduction in the size of such equipment as telephones, hearing devices and military uses.

Powder metallurgy continues to make strides in the metal industry. Iron powder, with ductility of mild steel, has been compacted. The use of high-density alloys for dampening, balancing, and where high moments of inertia are desired, has helped powder metallurgy advance.

A keen competition has arisen in the methods of making parts. While shell molding was supposed to be the answer to all casting problems, this has proven to be an optimistic outlook, even though a 2/3's cost reduction from cast to shell molding has been achieved.

Cold heading, cored forgings, electroforming, die casting and extrusions are presently giving the more well-known methods keen competition.—**Reported by Louis F. Calzi, Jr., for the Philadelphia Chapter.**

Chapter Yearbooks Available

All local chapter secretaries of the American Society for Metals have on hand the yearbooks of most of the other chapters. A.S.M. members are at liberty to request the addresses of members and sustaining member companies from their chapter secretaries if the information is available.

Gives Advantages And Uses of Light Metal Forgings

Speaker: A. J. Pepin
Wyman-Gordon Co.

A program entitled "Large Light Metal Forgings" was presented at a meeting of the Penn State Chapter by A. J. Pepin, quality and research manager of the Wyman-Gordon Co.

Mr. Pepin's talk dealt mainly with recent and future developments in the production of large light metal forgings by the use of hydraulic die forging presses. Beginning with a short history in the development of this method, he pointed out that the main impetus to this type of forging came during World War II. The Germans, lacking necessary aluminum alloys, were faced with the need of using magnesium alloys instead. These, however, were not adaptable to the prevailing hammer forging method of forming and necessitated a new method. Hydraulic die forging was the answer to this problem.

During World War II, the Wyman-Gordon Co., among others, was commissioned by the government to further develop this relatively new type of forging. Subsequently, an 18,000-ton hydraulic press was produced and put in operation in 1946. This press is not only capable of forging aluminum and magnesium alloys, but is used experimentally for steel and stainless steel as well.

Mr. Pepin stated that creating a press to form the large forgings was by no means the only obstacle. There was, and still is, difficulty in obtaining stock. At first, 8-in. wrought aluminum or magnesium billets were the maximum size for starting material. Since these were inadequate, castings were resorted to and subsequent problems of porosity and the need for working them were presented. The solution to the latter problem was "cross-working". Further, there was the necessity of developing large furnaces which would not allow the products of combustion to come in contact with the stock and permit, as well, full-time operation of the press.

The forging dies also proved troublesome. There was the difficulty of producing duplicates easily, but this was substantially reduced with the development of a die-making system by which the features of a master model are transcribed by a cutter to a die block. The necessity of practical relationships in design were stressed so that forging would be feasible.

Punctuating his lecture with slides, Mr. Pepin spoke of the new plant which is being constructed. Within a year a 50,000-ton and a 35,000-ton hydraulic die forging press will be in operation. These machines may well be classified as "international" inasmuch as parts are being made in Germany, Italy, the United States and several other countries. Their specifications and the progress of construction were given by Mr. Pepin. Features such as the immensity of the construction were impressively portrayed by the slides.

As a summary of his talk Mr. Pepin showed a 12-min. sound film, "Large Light Metal Press Forgings", which showed the operational aspects and products of this new forming method using the hydraulic die forging press.—**Reported by W. B. Collins for the Penn State Chapter.**

Precision Casting Methods Outlined at Rocky Mountain Meeting

Speaker: Curtis C. Drake
Griffin Wheel Co.

The Rocky Mountain Chapter heard Curtis C. Drake, sales representative for the Rocky Mountain Area and plant superintendent of Griffin Wheel Co. His topic was "Precision Castings".

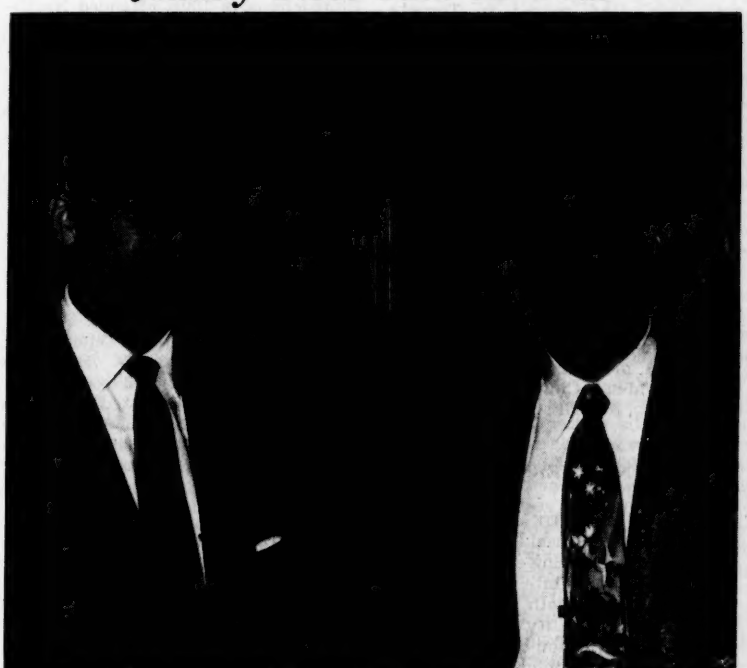
Among the various methods discussed were investment castings and the lost wax process, dry molds vs. green sand molds, shell molding, Rand-Upson cement bonded process, die castings and the Griffin Wheel graphite mold method. Mr. Drake gave a general description of each process and pertinent data on size limitations, tolerances and quantities presently produced.

Considerable interest was aroused when Mr. Drake made the statement that the Griffin Wheel Co. was producing railroad wheels as precision cast parts. Something as large as a car wheel is not normally considered a precision casting, but after this discussion of a rather unique process, it didn't seem as difficult to believe. The Griffin Wheel Co. has found that casting in a graphite mold will produce a very smooth surface and that very close tolerances can be maintained. To produce a good casting the ordinary pouring methods had to be abandoned.

Desirable results are obtained when the metal rises quietly into the mold and turbulence is overcome. This method of pouring was illustrated by slides. The as-cast part has a solid hub. The bore is made by using a cutting torch mounted on a special fixture. The wheel is heat treated so as to leave the surface in compression.

Mr. Drake presented the same talk before the Pueblo Group of the Rocky Mountain Chapter on a different date. —**Reported by Eugene Jiannetti for the Rocky Mountain Chapter.**

Jominy Gives Talk on Wear



The Kansas City Chapter Heard Walter Jominy, Chief Metallurgist, Research Division, Chrysler Motor Corp., Speak on "Wear" at the November Meeting. Mr. Jominy (left), who is shown with Chapter Chairman H. D. Beeson, gave the 11 principal factors affecting wear and explained each in detail. He stated that there are five main types of wear and discussed ways to attack and overcome them. (Reported by R. D. Scrom, Jr., Sheffield Steel Co.)

Meet Your Chapter Chairman

H. J. Huester

W. Hughes White

George Kappelt

BUFFALO

GEORGE F. KAPPELT was born and received his early education in Erie, Pa. He graduated from the University of Buffalo in 1940, at which time he joined Bell Aircraft Corp.'s general engineering laboratories. He progressed through various stages of physical testing in the metallurgical laboratory to unit leader of the physical testing group, the position he held during the war, and in 1948 was promoted to chief metallurgist, the position he now holds.

George and his wife Mary Frances have two children, Kathleen, age 5, and George, Jr., age 2. He has been secretary of the Technical Societies Council of the Niagara Frontier for the past three years, and is currently secretary of the A.M.S. nonferrous commodity committee and a member of A.S.M.'s vocational educational and handbook committees.

He is currently attempting to master the organ, and is also learning how to run a 125-acre fruit farm.

ONTARIO

BENTON DIXON was born in Montreal, Que., and moved to Toronto where he attended the local primary schools and later the University of Toronto where he majored in metallurgy. His first job out of school was as a shop laborer and he was subsequently a personnel manager, production and cost clerk, sales engineer and metallurgist. He is presently a director and sales manager of Dominion Wheel & Foundries Ltd., Toronto.

Benton, who was active in hockey, basketball, football and tennis while in college, now spends his spare time fishing, golfing and curling. He and his wife, Doris, have two children, Betty Jane, 15, and Douglas, 11.

He is a member of the Kingsway Lambton Men's Club and belongs to the A.F.S., A.S.T.E. and A.I.S.E.

NEW JERSEY

W. HUGHES WHITE is a native of Indiana and received his degree in chemical engineering from Purdue University. Mr. White, a metallurgical engineer for both Hoyland Steel Co. of New York City and Grammer, Dempsey and Hudson of Newark, specializes in the application and use of toolsteels and other specialty steels. He has spent 18 years in this type of work, preceded by 11 years in the manufacture and application of heavy machinery with the Harnischfeger Corp. of Milwaukee and New York.

White has many active civic interests. He was the first chairman of the Cub Scouts of Verona, vice-chairman of the Verona-Cedar Grove Scout Committee and a member of the Eagle Rock Boy Scout Council. He is a member of the Verona Methodist Church where he once taught Sunday school. He is a long time member of the Board of Education, having served as vice-president for three years, and as president this past year.

Mr. White and his wife Margaret have three sons: William, a graduate of Syracuse University is married and living in Caldwell, N. J.; Phillip is a senior at St. Lawrence University; and Malcolm is a freshman at Purdue.

JACKSONVILLE

H. J. HUESTER is the first chairman of the recently formed Jacksonville Chapter of the American Society for Metals. He was born in Philadelphia in 1901, attended Northeast High School and Drexel Institute of Technology, George Washington University, and Temple University. He joined the Navy and was commissioned Lt. (j.g.) in 1926, and now holds the rank of Commander, U.S. N.R., active. His many years of experience have been in the metallurgical laboratories of the Navy and Navy Air Force, and he is presently personnel and administrative officer of the overhaul and repair department at the Naval Air Station in Jacksonville.

Cdr. Huester is a 30-year member of A.S.M., and a 20-year member of both A.W.S. and A.S.T.M. He is active in several technical societies at the present time, is listed in Who's Who in Engineering and Who's Who in the Midwest, and has served on various aeronautical and engineering committees.

NORTHERN ONTARIO

ALAN R. FRASER was born in Ottawa, Ont., in 1910. He later moved to Toronto where he attended St. Andrew's College until 1927, and graduated from the University of Toronto in 1933 with a B.A.Sc. degree in chemical engineering.

Alan worked for the Hollinger Consolidated Gold Mines in the mills at Timmins, Ont., until 1935 and then became manager and assayer of a custom assay office in Val D'Or, Quebec. In 1937 he was a chemist with the International Nickel Co. of Canada. In 1938 he joined the Chromium Mining & Smelting Corp., Ltd., and held positions as chief metallurgist and plant superintendent before being promoted to his present position as director of research.

He is married and has three children, two girls, 13 and 6, and a boy, 11 years old. He is a member of the Rotary Club and his hobbies are power boating, fishing, deer hunting, tropical fish and coin collecting.

BALTIMORE

ROBERT B. POND was born Dec. 1, 1917, in Franklin, Va. After graduating from the local high school, he entered the U. S. Navy where he remained until 1938 when he received an honorable discharge and entered Virginia Polytechnic Institute, where he majored in metallurgical engineering. He was graduated with a B.S. degree in that field in 1942 and went to work for the Bethlehem Steel Co. at Sparrows Point, Md., where he spent most of his time in the plate and flanging mill as a supervisor.

In February 1947, he was appointed as instructor of mechanical engineering at the Johns Hopkins University and conducted courses in the metals laboratory and in materials of engineering. In July of that year he was appointed assistant professor and holds that rank today. He has been active in research concerned with solidification of metals and the plastic

R. B. Pond

deformation of metals.

Mr. Pond has five children—three boys and two girls—and finds time for such hobbies as farming, miniature handicraft and painting. He is an Elder in the Presbyterian Church and spends time teaching Sunday school and assisting in the direction of youth activities.

Speaks on Ultrasonic Testing at Joint Los Alamos Meeting

Officers, Guests and Speaker at a Joint Meeting of the Los Alamos Chapter A. S. M. and the Los Alamos Section S.N.T. Included, From Left, Front: C. H. Tenney, National President, S. N. T.; Kenneth Smith, Hughes Aircraft Corp.; Robert Reynolds, Lockheed Aircraft Corp.; W. C. Hitt, Who Presented a Talk on "Ultrasonic Inspection of Air Frame Parts"; D. E. Grimm, Chairman, Los Alamos Chapter A.S.M.; and R. T. Phelps, A.S.M. In the back row, from left, are: J. D. Steely, president, Los Alamos Section S.N.T.; J. E. Dodson, S.N.T.; D. W. Ballard, Sandia Corp.; W. N. Miner, A. S. M.; and J. H. Russell, S. N. T.

Speaker: W. C. Hitt
Douglas Aircraft Corp.

W. C. Hitt, assistant quality control manager at the Santa Monica plant of the Douglas Aircraft Corp., discussed "Ultrasonic Inspection of Air Frame Parts" at the annual joint meeting of the Los Alamos Chapters A.S.M. and the Society for Nondestructive Testing. G. H. Tenney, national president of S.N.T., was technical chairman of the meeting.

Mr. Hitt showed a short film and several slides illustrative of the use of ultrasonic testing for locating and evaluating subsurface discontinuities in air frame parts. Submerged testing, in which the parts undergoing inspection are submerged in water, has proved to be of great value. By using this form of inspection, it is possible to locate and evaluate defects which might pass unobserved by conventional contact scanning.

As yet, because of the difficulty in getting reproducible results with different types of equipment at different locations and with different operators, no set of standards has been worked out to allow rigid inspection specifications to be drawn. However, at the Douglas plant, the accuracy of the inspection method is such that the aluminum foundries furnishing the Douglas air frame parts have found good correlation between the ultrasonic test and destructive tests on parts returned.

In ultrasonic inspection, the operator's experience and judgment in adjusting the testing equipment and in interpreting the results in order to locate and identify defects is of the utmost importance. The exact location and determination of the size of a defect may mean the difference between accepting or rejecting an expensive forging.—**Reported by R. E. Tate for the Los Alamos Chapter.**

British Lecturer Speaks At Columbia University

Columbia University was host to the eminent British metallurgist, Alan H. Cottrell, professor at the University of Birmingham, England, in November when he presented the A.S.M. educational lecture on "Some Observations on Work Hardening in Metals".

Prof. Cottrell showed that one mechanism of work hardening could be quantitatively accounted for by the theory of dislocations. This was the case of the hardening induced by a small torsional twist during the course of a tensile test. This hardening is related to the phenomenon of latent slip plane hardening.

Other experiments showed the effect of complex cycles of annealing and straining at various temperatures on the stress-strain curves of aluminum single crystals. Among the results of these experiments was a negation of the mechanical equation of state for the single crystals tested. In these experiments, he demonstrated the existence of a new yield point phenomenon, in a face-centered-cubic crystal, that was not related to impurities, vacancies or the like. The yield point was induced by annealing after straining. **From *The Reporter*, Vol. 1, No. 2, published by the New York Chapter A.S.M.**

Applications of Steels To High Temperatures Given at Canton-Massillon

Speaker: C. L. Clark
Metallurgical Engineer
Timken Roller Bearing Co.

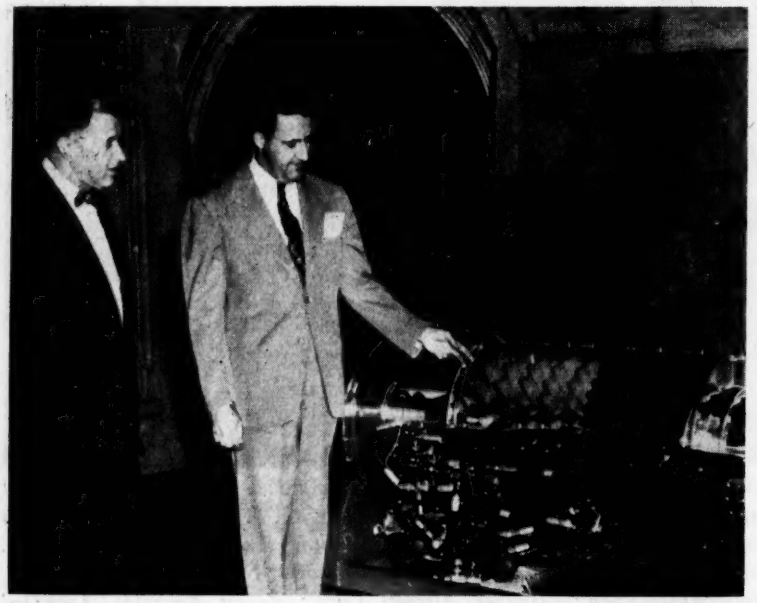
The November meeting of the Canton-Massillon Chapter featured C. L. Clark, metallurgical engineer, Special Steel Developments, Timken Roller Bearing Co. The subject of Dr. Clark's lecture was "Application of Steels to High Temperatures".

Dr. Clark prefaced his talk with a brief history of the development of high-temperature alloys for the power, oil and chemical industries, and for military applications. He pointed out that advancing temperatures and pressures are responsible for the rapid development of these alloys.

A number of slides were shown depicting the properties of alloys used for high-temperature service and Dr. Clark explained how these properties serve as a basis for establishing allowable stresses in design work. He called attention to the many problems confronting an engineer in selecting high-temperature materials for any given application.

The importance of economic factors in the application of these alloys was stressed, and examples of overdesigning resulting in waste of critical alloys were pointed out. Close cooperation between the metallurgist and the design engineer is necessary to derive the greatest technical and economic benefits for any given application.—**Reported by G. P. Michalos for Canton-Massillon Chapter.**

Demonstrates Jet Engine at Philadelphia



Philip DeHuff Describes the Cutaway Jet Engine Discussed in His Lecture "Jet Engines" to an Interested Member of the Philadelphia Chapter. Mr. DeHuff was guest speaker at the Chapter's Annual Temple Night Program

Speaker: Philip G. DeHuff

Manager, Engine Design Engineering
Westinghouse Electric Corp.

The 33rd Annual Temple Night meeting of the Philadelphia Chapter met at Temple University with a dual purpose. Not only was this the first meeting for the Temple course but it also kicked off a drive to increase the chapter membership by 300. Philip De Huff, manager of engine design engineering, Westinghouse Corp., spoke on "Jet Engines".

After briefly tracing the history of jet engines and gas turbines as applied to aircraft, Mr. De Huff narrowed his talk to the straight line design of engine made by Westinghouse. In this engine, based on the very first type of engine designed, the intake air is compressed to a ratio of 6:1, mixed with the fuel, then ignited. After ignition the expanding gases pass through a turbine and in passing out the exhaust at the rear of the engine creates the thrust or useful power for propelling the aircraft. The sole purpose of the turbine is to drive the direct-coupled compressor in the front of the engine used to compress the incoming air.

Today's trend is toward larger power plants for use in larger aircraft for use at higher altitudes. Engines weighing 4000 lb. and developing 10,000 lb. thrust are in use today. This higher thrust is obtained by either increasing the velocity of the exhaust gases by using an afterburner and/or increasing the quantity of air compressed. Since the engine is less dependent on the surrounding atmosphere than propeller driven aircraft it is possible to operate it at higher altitudes.

Increasing the horsepower output of piston driven engines results in disproportionately larger frontal areas and higher wind resistance which is not encountered in jet engines so that the trend is more and more towards the use of the jet engine. The main metallurgical problems encountered in attempting to realize the maximum output of these engines has been the effect of the higher operating temperatures for long periods of time on metals. There is a lack of sufficient design and property data of even the common metals at elevated temperatures and even less for the special alloys. Stress analysis at these temperatures also requires much more effort.

In closing Mr. De Huff showed slides of actual engine part failures as well as data on various materials at elevated temperatures.—**Reported by Charles C. Mathews for the Philadelphia Chapter.**

Warns Members of Duty To Protect Fifth Freedom

Speaker: William S. Livengood, Jr.

Bureau of Internal Affairs
Harrisburg, Pa.

The Constitution of the United States provided us with Four Freedoms—these cannot exist, however, without a fifth, unmentioned in that document—political freedom. Political freedom is our guarantee of protection from the government.

History has demonstrated that although this Fifth Freedom must be won with blood, it is often lost through peaceful means. The primary lever to the loss of political freedom is the indifference of the electorate. Therefore, the preservation of our heritage requires unanimous exercise of the voting privilege.

The Hon. William S. Livengood, Jr., secretary of internal affairs, delivered the preceding message to the York Chapter in a talk entitled "The Citizen and His Government". The introduction of a nontechnical speaker to the season's program was well received by the members and the enthusiasm brought forth many requests for a similar session during the next season.

The following sustaining members of the Chapter were presented with A.S.M. Certificates of Recognition: York County Gas Co.; Peter A. Frasse & Co., Inc.; Hill, Chase & Co.; Edgcomb Steel Co.; York Steel Co.; Precision Drawn Steel Co.; Wyckoff Steel Co.; W. Wirt Young and Associates; and Horace T. Potts Co.—**Reported by John A. Gulya for the York Chapter.**

Talks on Machinability Of Metals at Notre Dame

Speaker: W. H. Splinter

Machinability Engineer
Republic Steel Corp.

The Notre Dame Chapter heard W. H. Splinter, machinability engineer for the Republic Steel Corp. speak on "Machinability of Metals" recently.

With the advancement in technology, the mills have been constantly improving their steels. Physical properties have been improved remarkably, but these same properties have introduced new problems for the machinists who must use these steels. Where there used to be a half-dozen different grades of steel, there are now hundreds, each calling for a different technique in machining. Many of the old-time machinists have been slow to realize this fact, and as a result, have been unable to get out satisfactory production.

Mr. Splinter showed how the proper cutting technique for a certain steel depended on a number of factors; structure, hardness, heat treat, chemical analysis (especially carbon and sulfur), type of machine or cutting operation, coolant, etc. Since most of these items are closely related to the science of metallurgy, he strongly recommended that the machinability department of a plant be under the direction of a trained metallurgist who would have the technical background for evaluating these factors.

Mr. Splinter gave a number of case histories of machining difficulties and the manner in which they were overcome.—**Reported by R. C. Pocock for Notre Dame Chapter.**

Predicts Growing Uses for Titanium —The New Metal

Speaker: George F. Fraser
Sales Manager
Rem-Cru Titanium, Inc.

"Titanium, the New Metal" was discussed by George T. Fraser, sales manager of Rem-Cru Titanium, Inc., recently before the Columbus Chapter.

The speaker emphasized one of the big problems of titanium producers —how to put a curb bit on the design engineer to keep him from putting titanium into every part of an airplane. At present, 90% of the industry's output is going into aircraft and the remainder to ordnance. The producers have the privilege, however, of selling 10% of their output to nondefense lines. It is anticipated that the chemical, textile, petroleum, wood pulp and food industries will eventually become an important part of the titanium market. Because of the high price per pound of titanium today (about $15), industrial uses at first will be largely in equipment for which maintenance is very high and where the superior corrosion resistance of titanium will reduce down-time considerably.

National production of titanium this year will be about 1500 ingot tons, with forecasted production of about 5000 ingot tons next year and 12,000 in 1955.

Titanium ingots are made by melting titanium sponge in argon in water-cooled, electric-arc furnaces. Titanium sponge is to the titanium industry what pig iron is to the steel industry. Mr. Fraser described the Rem-Cru furnaces used to produce ingots up to 25 in. in diameter and weighing up to 4000 lb. The ingots are forged into slabs or billets which are then rolled at 1500° F. A Sendzimir mill, a cluster roll with 2½-in. work rolls, is being used to obtain a reduction in only six passes which formerly required 30 on the 4-high. The largest continuous coil of titanium strip yet produced weighed 9000 lb. Titanium sheet is being produced to the standard AISI specifications for flatness which apply to stainless steel.

The speaker described the ABC's of titanium alloys—"A" for alpha phase, "B" for beta phase, and "C" for combined alpha plus beta.

Alpha-phase alloys have useful strength up to 1200° F., resist air contamination to 2000° F., have no heat treatment sensitivity and possess good impact strength. Disadvantages include sheet bend ductility not quite so good as alpha-beta alloys and poorer than all-beta alloys, and they require more power to roll.

Beta phase alloys are strong, both cold and hot, and have excellent bend ductility. They are, however, vulnerable to contamination from the atmosphere at high temperatures and are a big consumer of the strategic alloys.

"C" represents combined alpha and beta for compromise performance. These alloys are strong cold but are relatively weak above 950° F. They are easy to forge, roll and form, possess good ductility, and are heat treatable to higher strengths. However, this heat treat response leads to loss of ductility if not properly controlled, and there are variations from heat to heat. Other disadvantages include poor weld ductility, a temperature ceiling for useful strength of 800° F., and embrittlement by air exposure of several hours at temperatures greater than 1400° F.

Titanium has four properties which make it attractive. These are light weight, corrosion resistance, relatively high strength and toughness.

Titanium is used in the nacelles and firewalls of the Douglas DC-7 commercial airplane. The saving in weight will help pay for the added cost by increasing the payload. The tailcone on the Lockheed F-94 is all titanium, and titanium is used in the North American FJ2 Fury. No jet engine production parts are being made of titanium at this time, but they will be soon. The use of titanium will save about 450 lb. in weight in a typical engine.—**Reported by Ellis Fletcher for Columbus Chapter.**

Pangborn Plans Celebration

The year 1954 will mark the celebration of the golden anniversary of Pangborn Corp., Hagerstown, Md., manufacturer of blast-cleaning and dust control equipment. Thomas W. Pangborn, president, sold his first sand-blast machine in New York City in 1904, and in 1905 John C. Pangborn joined his brother's venture. Growth was rapid and the plant established in Jersey City in 1909 was outgrown in 1912, at which time the business moved to Hagerstown.

Copper Men Speak in Jacksonville

From Left: Harry J. Huester, Chairman of the Jacksonville Chapter, Is Shown With Ira T. Hook, American Brass Co., Speaker; Parker Capps, Representative of the Chapter to the National Metal Show in Cleveland in October; and J. L. Kimberley, American Smelting and Refining Co., Speaker

Speakers:
Ira T. Hook
American Brass Co.
J. L. Kimberly
American Smelting & Refining Co.

Two experts in the field of copper and copper-base alloys spoke at the third meeting of the Jacksonville Chapter, attended by approximately 70 members and visitors.

Ira T. Hook, research engineer, American Brass Co., provided basic information on the "Melting and Casting of Copper and Copper-Base Alloys". The various applications of the copper-base alloys and their increasing value in the electrical, design, corrosion and ornamental fields were covered by Mr. Hook. A kodachrome sound film "Copper Mining, Smelting and Refining in Anaconda's Montana Mines" was also presented.

John L. Kimberley, sales manager, continuous cast products, Perth Amboy plant, American Smelting and Refining Co., spoke on the "ASARCO Process for Continuous Casting of Copper-Base Alloys". Although this process has been in use for some time, the illustrated lecture on this subject was the first in the State of Florida.

Visits through a military installation, foundries, and points of interest in the city were enjoyed by the speakers, and the reception given by the Chamber of Commerce and officials of the city, including Mayor Burns, was a high point in their busy day.

During the meeting Parker Capps, representative of the Chapter to the National Metal Congress and Exposition, made a report on his visit. He stated that his knowledge of the English language did not contain sufficient adjectives of praise and amazement to adequately describe the Show. —**Reported by Kingston G. Wolf for the Jacksonville Chapter.**

Concludes Lectures on Heat Treating Steel

Muir Frey, Assistant to the General Works Manager, Tractor Plant, Allis-Chalmers Manufacturing Co., Gave a Series of Lectures on "Heat Treatment of Steel" for the Chicago Chapter's Educational Series This Past Fall. Shown from left, are: Otto Zmeskal, chairman; Mr. Frey; and Walter Troy, Armour Research Foundation and educational committee chairman

The Chicago Chapter presented an educational series of four lectures on "Heat Treatment of Steel", followed by a fifth meeting consisting of a tour through the new Lindberg Steel Treating Plant, during October and November. This series was dedicated as an unofficial tribute to the late Marcus Grossmann, and used the latest edition of his book, "Principles of Heat Treatment", as a text.

Muir Frey, assistant to the general works manager, Tractor Plants, Allis-Chalmers Manufacturing Co., did an outstanding job as the lecturer in presenting the subject in a clear, easily understandable manner. His wide experience and knowledge enabled him to combine a valuable blend of sound theory and practical information to satisfy the broad interests of the audience.

The series covered the following subdivisions of the subject: Principles of Hardening; Hardenability and Changes During Cooling; Tempering, Normalizing, and Annealing, and Case Hardening and Miscellaneous Operations.

Each lecture dealt with both fundamental theories and practical applications of all the processes, followed by a discussion period in which the audience participated. An A.S.M. certificate was presented to those attending the full series.

Credit for the success of this series, which had "Standing Room Only" attendance, with many reservations refused because of lack of space, is attributed both to the ability of Muir Frey as the speaker and to the hard work of the Educational Committee with Walter Troy, Armour Research Foundation, as chairman. Consideration is being given to repeating this topic next year.—**Reported by J. A. Erickson for the Chicago Chapter.**

Special Libraries Association Sponsors Translations Pool

The Special Libraries Association, in cooperation with the John Crerar Library, Chicago, is pleased to announce a new translations service. It has been created in recognition of the increasing need for information regarding existing translations and availability of inexpensive copies.

The Association has deposited 1300 translations in the Crerar Library, which form the nucleus of the Pool. In the near future a list of these translations will be available for distribution. Arrangements are underway for the listing of future contributions in technological journals in the fields covered by the translations. Because the usefulness of the Pool will be in direct proportion to the number of translations available, contributions are solicited from government agencies, technical societies, universities, industries and individuals. Contributions may be made by the deposit of good copies of complete transactions. If copies are not available for deposit, they may be loaned to the Crerar Library for a short time, with permission to microfilm, or alternatively, a 35-mm. microfilm may be deposited. Permission to lend or to reproduce in photocopy is a condition of deposit.

Contributions and requests for information regarding the availability of translations should be addressed as follows:

S.L.A. Translations Pool,
John Crerar Library,
86 East Randolph St.,
Chicago 1, Ill.

Photoprint or microfilm copies of the translations listed, may be obtained at the regular rates charged by the Crerar Library. Currently, these rates are $1.40 for 10 pages, or fraction thereof of photoprint of 50 pages, or fraction thereof of microfilm, *plus* a service charge of $1 for each translation. Discounts of 3.5% to 14% are allowed on advance purchase of photoduplication coupons. A price list will be sent on request.

In view of the recent announcement by the National Science Foundation of the establishment of a center for holding and photoduplicating scientific translations with particular emphasis on those in Russian, the S.L.A. Translation Pool will be devoted to translations from languages other than Russian. Russian translations presently in the Pool will be transferred to the new center.

Industrial BRIEFS

The Westinghouse Electric Corp. will build a new metals development plant in Blairsville, Pa., with completion scheduled by late 1955. Although the purpose of the new facility will be metallurgical development, its production will be geared mainly for feeding specialty materials within Westinghouse.

* * *

The growing need for women engineers in the current shortage of scientists and engineers was pointed out recently by Arthur S. Flemming, director of the Office of Defense Mobilization, in a speech given at a convention of the Association of Land Grant Colleges and Universities. Dr. Flemming warned that a fresh international emergency would leave us shorthanded, a mistake that Soviet Russia is not making.

* * *

The Colorado Plateau, covering parts of Utah, Colorado, Arizona and New Mexico, has been predicted as an unlimited uranium source. Most promising areas for production of the uranium ore lie from 1500 ft. to 3500 ft. below mountain masses or swells on the plateau's crust.

* * *

Masking tape, which is being used at oven temperatures up to 325° F. on treated metals such as anodized aluminum, pickled steel and dichromated magnesium, has been developed by the Minnesota Mining & Manufacturing Co. It is said to come off the treated metal surfaces without leaving adhesive deposits.

* * *

The Wall Colmonoy Corp., Detroit, has introduced a welding-rod material for repairing manganese steel castings which they call Walmang. The new material produces weld metal having the same manganese content and wear resistance as cast 12% manganese steel.

Past Chairmen Meet in Minnesota

Present at the Past Chairmen's Night Meeting of the Minnesota Chapter Held in November Were, Front Row, From Left: H. S. Jerabek, George C. Priester, David Tissing, T. L. Joseph, Leonard D. Jaffe of Watertown Arsenal Laboratory, Who Spoke at the Meeting, R. L. Dowdell, Past National Treasurer, Walter E. Sweet, and W. B. F. Mackay, Chapter Chairman. Top row, from left: A. A. Gustafson, J. C. Neemes, Jr., L. D. Wolff, R. W. Bingham, H. H. Blosjo, Howard O. Williams, and D. E. Hult (Photograph by Don Berg)

Speaker: L. D. Jaffe

Watertown Arsenal Laboratory

The Minnesota Chapter's Past Chairman's night featured L. D. Jaffe, chief of physical metallurgy, Watertown Arsenal Laboratory. He spoke on "Temper Brittleness".

Temper brittleness is a tendency to brittle break developed by holding at a temperature between 700° F. and the A_1 transformation temperature. The tendency is designated by the highest temperature at which the Charpy break is brittle. Brittle break is indicated by curved as opposed to flat facets in the granular break surface. Special etch procedure with picric acid in ether or water brings out curved grain boundaries in temper brittle material.

Prolonged exposure to tempering temperature below the austenitizing temperature increases temper brittleness. Antimony, phosphorus, chromium, nickel and manganese all increase temper brittleness. Temper brittleness does not occur, however, with carbon below .003%. Coarse grain, perhaps due to reduced grain boundary surface, also tends to increase temper brittleness. Silicon, sulphur, nitrogen and oxygen do not appear to increase temper brittleness and hydrogen has not been explored. Molybdenum up to .5% tends to retard temper brittleness.—**Reported by Knox A. Powell for the Minnesota Chapter.**

Ferro Subsidiary Formed

Formation of Ferro Powdered Metals, Inc., Salem, Ind., a new, wholly owned subsidiary of Ferro Corp., Cleveland, has been announced.

The plant at Salem encompasses complete new manufacturing, laboratory and office buildings and facilities. The most modern equipment has been installed, including presses, sintering furnaces, mixing equipment, precision tools and inspection devices. From this up-to-date plant, Ferro can furnish high-precision powdered metal machine parts for the aircraft, automotive, appliance, business machine, and agricultural equipment industries.

Los Alamos Meeting On Developments in Sintered Carbides

Speaker: Malcolm M. Judkins

Firth Sterling, Inc.

A recent meeting of the Los Alamos Chapter featured Malcolm F. Judkins, manager of the New Products Division, Firth Sterling, Inc., who presented a lecture on "New Developments in Sintered Carbides".

Mr. Judkins reviewed the production of carbide powders and described in some detail the following methods of compacting powders: Cold pressing, centrifugal compacting, isostatic pressing, hot pressing and extrusion.

M. F. Judkins

The properties of some interesting cermets were described and their potential applications were pointed out. According to Mr. Judkins, hope for improving the performance of jet engines lies principally in the development of suitable cermets. Slides showing the results of heat tinting and color photomicrography in the study of multicarbide materials were presented by the speaker.

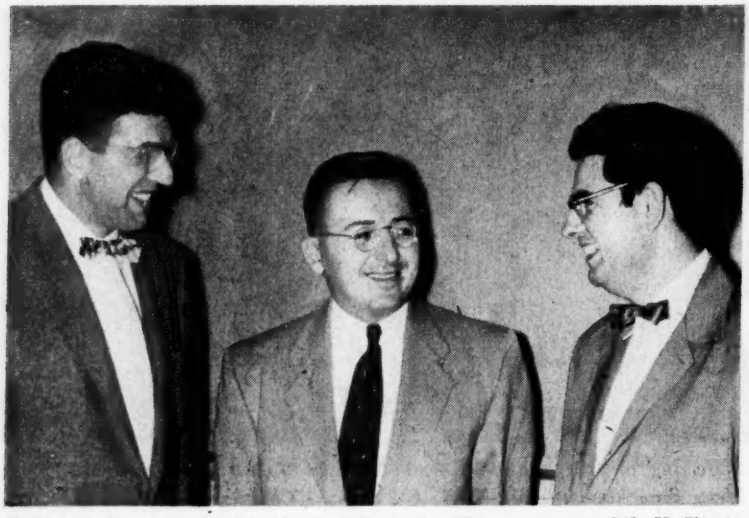
A technique of considerable interest to the audience was the electromechanical method of machining carbides in which the electrical forces generated exceed the tensile strength of the material and rip the grains of hard material away from the stock.—**Reported by R. E. Tate for the Los Alamos Chapter.**

Physics Institute Schedules Conference

The H. H. Wills Physical Laboratory of the University of Bristol, in cooperation with the International Union of Pure and Applied Physics and the Institute of Physics, London, is organizing a conference on "Defects in Crystalline Solids", to be held from July 13-17, 1954 in Bristol. The organizers propose to give particular attention to defects such as dissolved atoms, vacancies and F-centers, to microwave resonance methods of investigating their properties, and to the way in which they react with dislocations. Thus dislocations will be discussed in their chemical aspects, as influencing diffusion and precipitation in the solid state, rather than in relation to plastic flow.

Authors from the United States are invited to present their papers, and the Conference is open to any scientist interested in this field. Further particulars may be obtained by writing: The Secretary, H. H. Wills Physical Laboratory, Royal Fort, Bristol 8; or, The Secretary, Institute of Physics, 47, Belgrave Sq., London S.W. 1, England.

Dual Speakers at Columbia Basin



E. Wayne Everhart (Left), Head of Corrosion Department, and G. H. Kissin (Center), Head of the Metal Finishing Department, Kaiser Aluminum and Chemical Corp., Spoke on "Selection of Corrosion Tests" and "Coatings for Aluminum" at a Meeting of the Columbia Basin Chapter. At right is R. S. Dalrymple, Chapter vice-chairman and technical chairman of the meeting

Speakers: E. Wayne Everhart and G. H. Kissin

Kaiser Aluminum & Chemical Corp.

The initial meeting of the Columbia Basin Chapter featured talks by two representatives of the Metallurgical Research Department, Kaiser Aluminum & Chemical Corp. E. Wayne Everhart, head, corrosion department, discussed "The Selection of Corrosion Tests" and G. H. Kissin, head, metal finishing department, spoke on "Coatings for Aluminum".

Mr. Everhart's remarks on corrosion tests dealt with sample selection and preparation, testing procedure, and sample examination. The desirability of using an adequate number of samples and the retaining of untested duplicates as standards was stressed. The effect of the metal on its environment is often of interest, and the formation of a precipitate in acetic acid stored in aluminum containers was given as a commercially important example. The inadvisability of re-exposing tested samples was noted. Prior to examining tested specimens, Mr. Everhart recommended the use of one of the standardized ASTM cleaning procedures. A discussion of examination techniques and methods for the presentation of data concluded his talk.

Dr. Kissin discussed natural surface oxides and chemical conversion coatings for aluminum. The latter are formed by oxidation in solutions containing phosphate, and chromate ions. Various commercial anodizing baths and sealing treatments for anodized layers were presented. The importance of chromium-plated aluminum die castings to the automotive industry is reportedly increasing. The electrodeposit is applied to a zinc layer covering the aluminum. This thin zinc undercoat is applied by the zincate process. Any organic coating which is now successfully applied to steel can also be applied to properly prepared aluminum surfaces. Until recently the high-firing temperatures required for porcelains precluded their application to aluminum, but Du Pont has now developed several lead borosilicates which are feasible. These frits have firing temperatures in the range 900 to 1000° F. A presentation of the costs of the several types of coatings which can be applied to aluminum concluded Dr. Kissin's address.—**Reported by W. E. Ray for the Columbia Basin Chapter.**

How Expansion and Contraction Are Used To Straighten Metals

Speaker: Joseph Holt

Consultant

Joseph Holt, nationally known for his pioneering of a unique straightening method for steel structures, discussed "Contraction and Expansion as Friends in Need", before Puget Sound Chapter.

Mr. Holt emphasized the many advantages and the simplicity of this method of straightening steel members once the basic principles are understood. Use is made of the great forces available when metal contracts or expands, and these forces are controlled in direction and magnitude by the pattern and amount of heat that is applied. The only equipment used is an oxy-acetylene torch. No jigging or fixturing is used; by ingenious use of heat, areas of the member can be made to serve this purpose and maintain rigidity even though the member is under load. It is important that each job be analyzed so the type of magnitude of loading for each member is known.

Utilizing these principles and a great amount of skill, Mr. Holt has straightened many complex structures. Because of the small equipment cost, and the fact that members are straightened in place, great economies are realized. As an example, the Umpqua River bridge in Oregon, which had suffered loss of its center pier and dropped 3.5 ft., had many of its members bent and twisted. Using the oxy-acetylene torch, in conjunction with lifting jacks, the bridge was repaired at an estimated saving of $400,000.

Although all of his work was done on mild steel, Mr. Holt is convinced there are great opportunities with other materials such as aluminum alloys and stainless steels. Even though he has developed his techniques to a fine art, the underlying principles are basic and can be developed to make this type of operation an exact science.—**Reported by Eugene E. Bauer for Puget Sound Chapter.**

Milwaukee Completes 21st Educational Lecture Series

The Milwaukee Chapter's 21st educational course just completed, "Metallurgy at Work", consisted of a series of five lectures, as follows:

Nov. 2—Metallurgy at Work in Industry, by Max Hansen, manager, metals research, Armour Research Foundation.

Nov. 9—Metallurgy at Work in the Forge Shop, by E. O. Dixon, vice-president in charge of metallurgy and research, Ladish Co.

Nov. 16—Metallurgy at Work in the Foundry, by S. C. Massari, foundry division, Hansell-Elcock Co.

Nov. 23—Metallurgy at Work in Fabrication, by Anton L. Schaeffler, metallurgist, welding research, Allis-Chalmers Manufacturing Co.

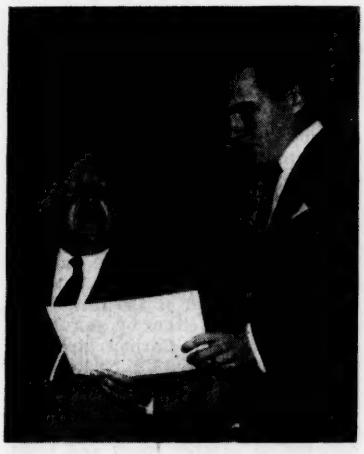
Nov. 30—Metallurgy at Work in Engineering, by A. F. Sprankle, metallurgical engineer, Timken Roller Bearing Co., Steel and Tube Div.

Spectrographers to Meet

The American Association of Spectrographers is planning a symposium on "Direct Reading Emission Spectroscopy" in Chicago on May 7, 1954. The symposium will be broken down into the following subtitles: Iron and Steel, Nonferrous Metals, and Metal in Nonmetallic Materials. Contributed papers are welcome. Information can be obtained by writing: M. E. Slagel, Chairman, U. S. Reduction Co., Box 30, East Chicago, Ind.

Cincinnati Students Win Science Awards

The Cincinnati Chapter honored the local A.S.M. Science Achievement Award winners in a ceremony early in November. Kenneth E. Vordenberg, assistant supervisor of science teachers in the Cincinnati Public Schools and local representative of the National Science Teachers Association,



Kenneth E. Vordenberg Is Shown Presenting a Third-Place Award to Daniel Shannon (Right) for His Project on the "Resistivity of Gases at Low Temperatures" Which Was Entered in the A. S. M.'s 1953 Science Achievement Award Program

presented a third place award to Daniel Shannon, a 12th-grade student at St. Xavier High School when his entry, "Resistivity of Gases at Low Temperatures", was made, and now a pre-medical student at St. Xavier University. An honorable mention award was given to Roger Berry for his project on "Mirror Research", completed while in the 12th grade at Withrow High School. Mr. Berry is now taking a chemical engineering course at the University of Cincinnati.—**Reported by W. D. Whalen for the Cincinnati Chapter.**

Explains Art of Microscopy Before Birmingham Chapter

Speaker: S. P. Newberry
General Electric Co.

The technical session of the November meeting of the Birmingham Chapter featured a speech by Sterling P. Newberry, development engineer, General Engineering Laboratory of the General Elctric Co. on the subject of "Microscopy". The talk was extremely interesting and featured slides showing various pictures taken with the aid of the electron microscope.—**Reported by Walton P. McCord for the Birmingham Chapter.**

Replacing Nickel With Manganese in Stainless

Speaker: T. A. Pruger
Allegheny Ludlum Steel Corp.

Manganese is the solution to the nickel shortage, at least as far as austenitic stainless steel is concerned. This was the theme of the talk given by T. A. Pruger, metallurgist at Allegheny Ludlum Steel Corp., on "Manganese, Key to Future Growth of Stainless Steel" before the Washington Chapter.

The many virtues of austenitic stainless steel, such as high strength, good ductility, weldability, resistance to corrosion, strength at high temperatures and toughness at low temperatures, and low magnetic permeability, have resulted in a widespread and growing acceptance of these materials ever since their invention early in the century. Mr. Pruger pointed out that the production of austenitic stainless steel has doubled every decade since. It is not difficult to understand why this lusty newcomer cannot long continue to grow in accordance with this geometric progression if it persists with its current rich diet of 8% of scarce and costly nickel.

This impediment to the future growth of stainless steel can be evaded, Mr. Pruger stated, by replacing most of the nickel by more plentiful austenite stabilizers, notably manganese. This solution was studied in the 1930's in the countries where nickel supplies were poorer than in the U. S., and which, therefore, encountered nickel shortages before we did. Such efforts to replace nickel by manganese have been successful in developing manganese stabilized stainless steels which meet the demands of many applications.

Mr. Pruger compared the merits of two manganese stainless steels—17% Cr, 16% Mn, 2% Ni and 15% Cr, 17% Mn, 1% Ni—with the conventional 18 Cr-8% Ni, on the basis of such practical considerations as corrosion resistance, creep rate, oxidation resistance at high temperatures, weldability, hot workability, rate of strain hardening, strength, ductility and costs. These steels have the desirable mechanical properties of 18 Cr-8% Ni steel, but are inferior in resistance to corrosion in certain media. This deficiency can be overcome by increasing the nickel content, and recent tests of a newer alloy—18% Cr, 10% Mn, 4% Ni—showed that this alloy is similar to 18 Cr-8% Ni in the boiling nitric acid, salt-spray and copper sulfate-sulfuric acid tests. With such an alloy, twice as much stainess steel could be made with the same amount of nickel. —**Reported by Richard Raring for the Washington Chapter.**

Golden Gate Hears Talk On Brazing Techniques

Speaker: Harry E. Lewis
Pyromet Brazing & Heat Treating Co.

At the November meeting of Golden Gate Chapter, Harry E. Lewis, partner and general manager, Pyromet Brazing & Heat Treating Co., gave a talk on "Brazing". Mr. Lewis, who has had over 25 years experience in this and other metallurgical activities, is an authority on this subject.

He discussed the various types of brazing alloys, their melting temperatures, fluxes required, illustrating his lecture with slides. He had examples of complex designs that could be successfully produced only by brazing the component parts on hand to illustrate his talk.

The speaker is a past-chairman of both the Golden Gate and Eastern New York Chapters, A.S.M. — **Reported by Gordon von Planck for the Golden Gate Chapter.**

At Philadelphia's National Officers Night

J. B. Austin and W. H. Eisenman Seem To Be Enjoying the Dinner at the National Officers Night Meeting of the Philadelphia Chapter. Shown, from left, are: Francis B. Foley and W. B. Coleman, past national presidents; Mr. Eisenman; Dr. Austin; Dave Schmid, Chapter chairman; and Adolph O. Schaefer, national trustee. Dr. Austin gave an illustrated talk on "Magnification in Time". (Reported by Robert H. Straub for the Philadelphia Chapter)

Reviews Physical Testing Methods

Kenneth R. Wickstrom (Center), Baldwin-Lima-Hamilton Corp., Spoke on "Mechanical Testing and Physical Inspection Methods" at a Recent Meeting in St. Louis. With Mr. Wickstrom are, left, George A. Fisher, Jr., vice-chairman, and Martin E. Huether, chairman of the St. Louis Chapter

Speaker: K. R. Wickstrom
Baldwin-Lima-Hamilton Corp.

Speaking on "Mechanical Testing and Physical Inspection Methods" before the St. Louis Chapter, Kenneth R. Wickstrom of Baldwin-Lima-Hamilton Corp. concentrated his attention on two important types of testing—namely, tensile and hardness.

He first gave an elementary explanation of the principles involved in tensile testing, defining such terms as elastic limit, proof stress, proportional limit, yield strength and yield point, tensile strength, elongation, reduction of area and modulus of elasticity. The preparation of the test specimen is of great importance, although it is often slighted or overlooked, and the speaker pointed out various factors that must be taken into consideration to avoid introducing errors in test results.

The machines most commonly used for hardness testing are the Brinell, Scleroscope, Rockwell and Vickers. Mr. Wickstrom described these machines and the testing techniques used with them.

In addition to the talk Mr. Wickstrom presented a sound movie showing the history, development and applications of the SR-4 strain gage.—**Reported by Frank Delaplane for the St. Louis Chapter.**

New Jersey Course on Heat Treating Concluded

Speaker: Norman E. Woldman
Consulting Engineer

Representatives of 69 industrial organizations, the U. S. Air Force, the Atomic Energy Commission, the Port of New York Authority and three educational institutions attended New Jersey's fall educational course on the "Theory and Practice of Heat Treating". Norman E. Woldman, well-known consulting engineer, delivered the series of five lectures to an average audience of 300. Lively discussion periods followed each lecture in which practical problems dealing with current production were reviewed.

In the first lecture, Dr. Woldman discussed the general purpose of heat treating, covering definitions of heat treating terms, annealing processes for various purposes and the improvement in mechanical properties obtainable by hardening.

The second lecture on the principles and theories of hardening covered allotropic transformations, precipitation hardening and eutectoid transformations and a discussion of the practical application of these transformations.

In the third lecture Dr. Woldman considered the factors affecting hardenability, including methods of measurement, critical cooling rates and the effects of such factors as grain size, composition and prior cold work.

The last two lectures were strictly practical. Surface hardening by carburizing, nitriding, induction heating and flame heating were covered in one. In the other, Dr. Woldman drew on his extensive experience in the field to discuss the troubles encountered in commercial heat treatment. In this lecture he included the effect of design factors, causes of distortion, the development of quenching and grinding cracks and the effects of surface decarburization resulting from previous operations.—**Reported by John L. Everhart for the New Jersey Chapter.**

Describes Hot Spot Machining Process at Syracuse Meeting

Speaker: Leslie S. Fletcher
Sam Tour Co.

Leslie S. Fletcher, technical director for Sam Tour Co., presented a talk on "Hot Spot Machining" before the October meeting of the Syracuse Chapter.

Hot spot machining is differentiated from hot machining in that the whole bar is not heated but only that section ahead of the tool. Heating may be done either by gas flames or induction coil. Carbon steels up to .40% C, Grade "V" Nickel steel and S-816 were machined at various temperatures up to 1500° F. In each case more metal per minute could be removed at greater speed and feeds.

Changes in the microstructure and residual stresses were also discussed. —**Reported by J. A. Miskelly for the Syracuse Chapter.**

CORRECTION

In the report "History of Development of Silicon Iron Sheet" printed on p. 25, December 1953, *Metals Review,* Norman Grossmann was mistakenly identified as the discoverer of the fact that the crystalline structure could be oriented in a favorable direction by a controlled program of repeated cold rollings and annealings. This name should have read Norman Goss (A.S.M.)

Tatnall Reviews Fatigue Testing at Tulsa

Francis G. Tatnall (Center), Baldwin-Lima-Hamilton Corp., Spoke on "Fatigue Testing and Life Service" at the November Meeting of the Tulsa Chapter. He is shown with Ted Duncan (left), chapter chairman, and C. Sykora, program chairman. (Reported by J. C. Holmberg for Tulsa Chapter)

New Films

High-Frequency Induction Heating of Metals

The TOCCO Division of the Ohio Crankshaft Co. has completed a 30-min., full color, sound motion picture on the subject "High-Frequency Induction Heating of Metals". Further information about the film can be obtained by writing: D. H. Howe, Reynolds & Howe Film Associates, 165 East 191st St., Cleveland 19, Ohio.

The Heart of the Matter

A 16-mm. sound Kodachrome motion picture which was filmed at Latrobe Steel Co.'s mill at Latrobe, Pa. The picture runs about 22 minutes and shows the principal steps involved in the production of high alloy toolsteel from raw materials to finished products. Major and spectacular phases of production are depicted, including the many necessary quality control measures employed. The film also deals with the subject of stresses in finished tools, during manufacture and in subsequent use, what causes them, what to do about them. The film employes photoelasticity to duplicate the stress patterns in the steel. The film is available upon request to Latrobe sales representatives or by writing to the company at Latrobe, Pa.

Allegheny Ludlum Steel Corp.

Over 20 motion pictures in the Allegheny Ludlum film library are now available for free use to technical societies and other interested groups. These films cover the production, fabrication and end-use of the special alloy steels—stainless, tool and electrical—produced by the company. Further information about obtaining these films may be obtained by writing: C. B. Templeton, Manager Sales Promotion, Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22, Pa.

Shows Importance of Applying Metallurgical Factors to Product Design

Speaker: Joseph A. Burgard
Technical Sales Representative
Columbia-Geneva Division
U. S. Steel Corp.

The Golden Gate Chapter heard Joseph A. Burgard of the Columbia-Geneva Division, U. S. Steel Corp., give an address on "Applying Metallurgical Principles to Product Design" at a meeting recently. Many past and present employees of Columbia were guests of the Chapter for the evening.

Mr. Burgard's long experience in the field qualified him to point out the important metallurgical factors in the preliminary and sometimes final specifications submitted to bidders, that should be considered in designing structures and products which are so often overlooked. Many times specifications call for grades of steel, alloys or metals without due consideration having been made as to availability or cost, and when other, more available materials could as well have been used. Also, many times common grades of steel are specified where the end use requires a much higher grade for longer life or greater service. It is in this respect that the metallurgist can be of greatest help to the designer and engineer.

Mr. Burgard's lecture was well illustrated with lantern slides showing the importance of careful consideration of the various metallurgical factors embraced in even the simplest of product design.—**Reported by G. L. von Planck for the Golden Gate Chapter.**

How to Think Out Heat Treat Problems

G. B. Berlien, Partner in the Industrial Steel Treating Co., Spoke on "Best Practices for Everyday Heat Treating" Before a Meeting of the Los Angeles Chapter Recently. Shown above are, from left: J. Dickason, Metal Control Laboratories, chapter secretary; Mr. Berlien; and J. A. Chalk, Jr., of the Bethlehem Pacific Coast Steel Corp., chairman of the chapter

Speaker: G. B. Berlien
Industrial Steel Treating Co.

"Think" was the keynote of G. B. Berlien's talk, "Best Practice for Everyday Heat Treating", which was presented at a recent meeting of the Los Angeles Chapter.

Using various problem parts from his 30 years of experience, Mr. Berlien, now a partner in the Industrial Steel Treating Co., graphically demonstrated the importance of "thinking" out each new part. He stressed that consultation and thought before heat treatment would save many parts from costly postmortems. In the commercial heat treating shop the joint experience of the personnel can usually be drawn upon to provide an answer to any new problems that arise. The greatest difficulty is to allot the time needed to think about each new part.

Modern heat treating plants have more technical help in their shops than ever before, steel suppliers have made available to the heat treater the latest information available on their respective steels, and it is most important that the designer and heat treater think when utilizing the available knowledge. The book values for physical properties are usually based on standard sample sizes and due consideration must be given to mass heating and cooling rates that vary with section changes.

Mr. Berlien described the heat treatment of an air hardening die with a deep cavity. The section below the cavity was small compared to the mass around the cavity, and when a man-cooling fan was used to speed the air quench, the rate of cooling of the center with respect to that of the periphery of the die was such that the center bulged. When "thinking" was applied, the die was reheated and an air stream directed against each face of the mass below the cavity to speed cooling of this section, which resulted in the die returning to its original dimensional tolerances with the required hardness.

Further discussion on carbon and oil hardening toolsteels, high-carbon, high-chrome and hot work steels involving heating and cooling practices brought out various factors often overlooked.

Gaging the temperature in tempering using air convection equipment brings out factors of loading that may result in nonuniformity and methods of detecting such difficulties were emphasized by Mr. Berlien. —**Reported by Charles H. Dickson for the Los Angeles Chapter.**

Explains Shot Peening at San Diego

Chairman Gordon W. Hardy (Left) of the San Diego Chapter Talks With the Guest Speaker, Fred K. Landecker, Manager, Metal Improvement Co. (Center), and Frank H. Page, Laboratory Technician, Rohr Aircraft Corp. Mr. Landecker discussed "Shot Peening". (Photo by Rohr Aircraft Corp.)

Speaker: Fred K. Landecker

Metal Improvement Co.

Fred K. Landecker, manager of the Metal Improvement Co. of Los Angeles, addressed the San Diego Chapter at a recent meeting on the subject of "Shot Peening".

He described how shot peening is used to increase fatigue life of metal parts. To accomplish this, the surface of the finished part is pelted with fine round shot in special machines under fully controlled conditions. Every piece of shot acts as a tiny peen hammer. When the surface has been peened all over by the multitude of hits it is covered with a compressed layer which prevents the formation of tensile cracks.

It is well known that a crack cannot start in or propagate into a compressed layer. As nearly all fatigue failures start in the surface of a part, the highly compressed layer set up by shot peening produces the tremendous increase in fatigue life many industries have learned to use in their design.

Slides were shown illustrating how shot peening affected different types of metals and applications. Some specific applications discussed were where shot peening is used on coil springs, leaf springs, connecting rods, axles, gears and many parts used on automobiles, gears, shafts, and other component parts of aircraft engines.

Mr. Landecker described the use of shot peening in the straightening of pieces by using a calculated controlled blast on specific points of the part to be straightened. Specifically discussed was the application of a 40-in. ring gear of very thin wall design, which before shot peening was .106° out of round and only .003° after shot peening. This method is salvaging many machined parts which would have otherwise ended up in the scrap pile as a total loss.

One of the most interesting applications discussed was the use of shot peening for curving large sections of metal without the use of dies. Illustrated was an integrally stiffened wing skin which is used on the Lockheed Super Constellation. The panel, of 75 ST 6 aluminum, is 32 ft. long and 4 ft. wide and 1¾ in. thick before machining. About 91% of the metal is machined away before the application of shot peening to work it to the desired curvature. Special machines were designed by the Metal Improvement Co. to control the application of the shot, as the curvature requirements varied throughout the length of the panel which was of varying thicknesses, and to eliminate the distortion caused by machining.—**Reported by Arnold Ramsey for the San Diego Chapter.**

Corrosion of Metals Is Topic at Joint Meeting

Speaker: Mars G. Fontana

Chairman, Department of Metallurgy Ohio State University

A joint meeting of the Cleveland Chapter of American Society for Metals and National Association of Corrosion Engineers heard Mars G. Fontana, chairman of the department of metallurgy, Ohio State University, present a discussion on "Corrosion of Metals".

Dr. Fontana described the basic types of corrosion and complemented each description with a lantern slide showing representative samples. He pointed out various conditions which are conducive to corrosion and illustrated these conditions with actual occurrences in industry.

Factors increasing corrosion rate, such as change in solution acidity, materials and design of equipment were explained and illustrated. Dr. Fontana gave various methods for preventing or reducing corrosion. Methods of corrosion testing and the equipment used were also described —**Reported by J. B. Wilson for the Cleveland Chapter.**

Purdue Chapter Observes National Officers Night

The Purdue Chapter was visited by W. H. Eisenman, national secretary and Ralph Wilson, chief metallurgist, Timken Roller Bearing Co., immediate past-president of the A.S.M. at their annual National Officers Night meeting.

Mr. Eisenman commented on the past history and some of the important work now being sponsored by the Society.

Harold J. Bates, past-chairman of the Purdue Chapter and technical chairman for the meeting, introduced Ralph Wilson to the chapter.

Mr. Wilson spoke on "Metallurgical Engineering in the Alloy Steel Field". He discussed many of the time-honored concepts of engineering metallurgy and commented on the effect of surface stresses on steel as pertaining to wear and fatigue life. —**Reported by L. J. Ewalt for the Purdue Chapter.**

Discusses Design and Use Of Tandem Rod Mills

Speaker: J. Heartt Raub

Waterbury Farrel Foundry & Machine Co.

J. Heartt Raub, of the Waterbury Farrel Foundry and Machine Co., spoke at the November meeting of the New Haven Chapter on the "Design and Use of Tandem Rod Mills".

He stated that the first tandem rod mill in this country was imported from Germany after the first World War. Waterbury Farrel then improved the design in several respects. Reductions per stand were increased to about 15% per stand and mills were built with 6, 8, 10 and 12 stands. These were built in roll sizes of 4, 6, 7 and 8 in. diameters. These mills replaced bull blocks which had previously been used for this part of the reduction. The speaker showed slides made from assembly and cross section drawings and color photographs of typical mills in factories in Connecticut.—**Reported by Glenn F. Whiteley for the New Haven Chapter.**

Georgia Completes Course On Marketing Problems in Metalworking Industry

Speaker: H. Redfern Hollins
WRC Smith Publishing Co.

The Georgia Chapter recently sponsored a unique series of educational lectures on "Solutions to Marketing Problems in Metalworking". Lectures were delivered by H. Redfern Hollins, marketing and sales promotion director for the WRC Smith Publishing Co. Mr. Hollins, who is very well qualified in the field of marketing, is actively affiliated with the American Marketing Association, and is currently vice-president of the Atlanta Advertising Club. He is particularly acquainted with marketing problems in the Southeast.

Subjects covered by Mr. Hollins included Market Analysis, Equipping Salesmen and Industrial Advertising and Sales Promotion.

Throughout his lectures, Mr. Hollins stressed the interdependence of the product, the market and the sales organization in a successful merchandising operation. He termed these the apices of the eternal triangle.

No marketing problem can be solved by study of the market alone. Both the product and the sales organization must be analyzed to ensure that all three factors are compatible. For example, the product must be suited to the market and the market must be receptive to the product. Given a likely market, an appropriate sales organization must be set up and subsequently informed about the market and the product. This organization must be properly trained and integrated into the parent company.

Mr. Hollins emphasized the importance of discretion in the selection of sales personnel. Costs in lost orders and dissatisfied customers resulting from misfit salesmen run high. Aptitude testing may be helpful, particularly in the hiring of individuals with limited sales experience. This latter aspect of modern sales management deserves close study.

Personnel comprising the sales force should be trained and equipped to do the selling job expected of them. A well-rounded training program should include not only facts and figures on products and performance but thorough familiarization with company history and growth; an understanding of company policy on such matters as deliveries, credits, collections and service; and a knowledge of the individual's status in the company relative to compensation, insurance and sick leaves, vacations, prospects for promotion, etc.

In speaking of the role of advertising, Mr. Hollins indicated that in addition to arousing interest and creating a desire for a product it may in some instances be a means of getting a product to the market without going through a sales organization. Preparation of copy and layout, media selection, and the use of direct mail, films, novelties, etc., were covered. Particular emphasis was placed on trade paper advertising, and specific information pertinent to this media was well covered.—**Reported by Robert Raudebaugh for the Georgia Chapter.**

Boston Hears Talk on Strength of Alloys

From Left: S. H. Baylor, Chairman, E. E. Hargett, Coffee Speaker, J. C. Fisher, General Electric Co., and John Wulff, Technical Chairman, Discuss Dr. Fisher's Talk on "Strength of Alloys" After the November Meeting of the Boston Chapter. Mr. Hargett is with the Federal Bureau of Investigation

Speaker: J. C. Fisher
General Electric Co.

The possibilities for enormous gains in yield strength of metals provided much food for thought at Boston Chapter's meeting in November. John C. Fisher, metallurgy research department, General Electric Co., in a talk on "Strength of Alloys", spoke of the extent of the agreement between theories of the yield strength of metals and the actual measured values.

The old theory states that a perfect single crystal should be very strong, stretching elastically as much as 3% or more. This has been verified by the recent discovery of perfect crystal fibers of very great strength.

Modern theories of yield strength are designed to account for the lower strengths of practical metals and alloys that contain many imperfections. The important imperfections, as far as yielding is concerned, are dislocations. The problem of calculating the yield strength of an alloy is that of calculating how strongly dislocations are prevented from moving, for dislocations (the distorted regions bounding those portions of slip planes where unit slip has occurred from those portions where it has not), produce plastic slip by their motion.

Three means whereby dislocation motion could be resisted were described: Short-range order in an alloy crystal, which would have to be disrupted by slip; local segregation of impurities at a dislocation; and the presence of second-phase particles acting as "keys" to retard slip. These three means can account for up to about 100,000 psi. each in contributing to the yield strength of practical materials.

Dr. Fisher felt that we are coming closer to realization of the ideal of being able to calculate strengths from the knowledge of phase diagrams and compositions.—**Reported by R. A. Pomfret for the Boston Chapter.**

Roberts Speaks at Fort Wayne Meeting

Speaker: George A. Roberts
Chief Metallurgist
Vanadium Alloys Steel Co.

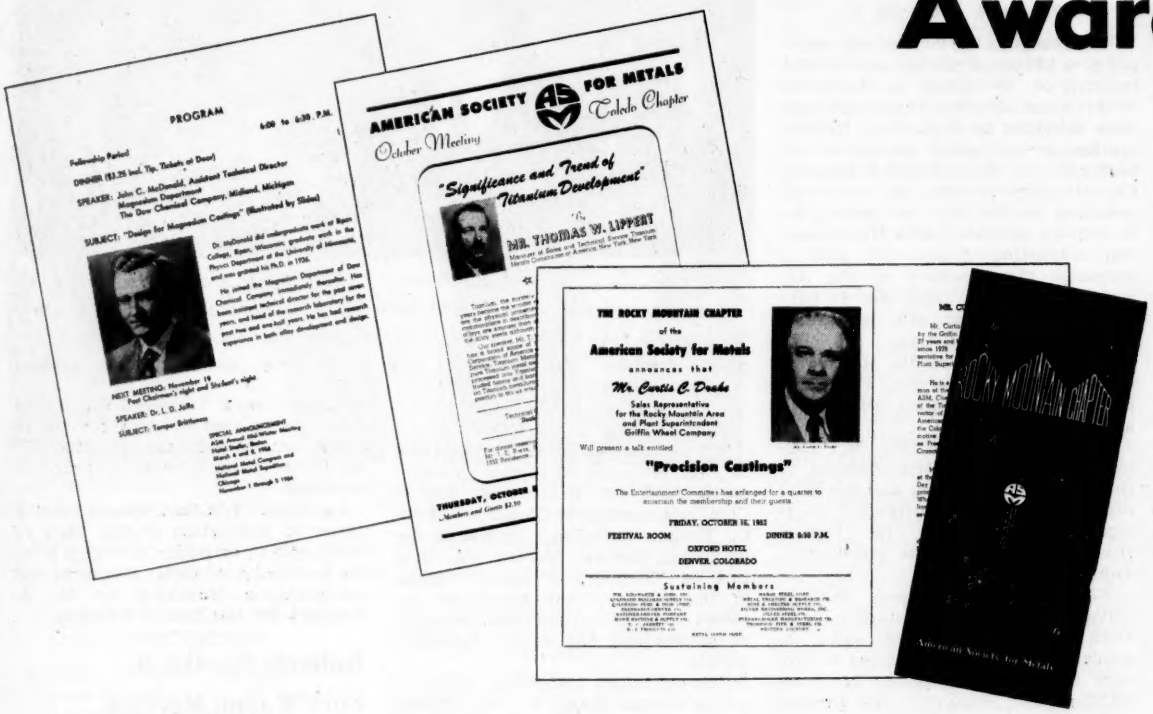
Fort Wayne Chapter heard George Roberts, chief metallurgist at Vanadium Alloy Steels Co. and vice-president of the American Society for Metals, review the educational program of the A. S. M., followed by an excellent discussion of "Toolsteels".

Dr. Roberts pointed out that there are approximately 95 types of toolsteels so that generalization would be extremely difficult and risky. However, he did consider four important factors pertinent to all toolsteels: alloying variables; heat treatment; structural variables; and physical properties.—**Reported by George R. Hemmeter for the Fort Wayne Chapter.**

Speaker Available

Alan R. Burman, vice-president of Cro-Plate Co., Inc., Hartford, Conn., has indicated that he would be very happy to discuss his company's finishing methods before the various chapters of the A.S.M. The process, which uses Cro-Plate's pressure blast two-speed wet-blasting units, should be of interest to chapters contemplating talks on finishing and related topics. Mr. Burman can be contacted at the Cro-Plate Co., Inc., Hartford 5, Conn.

Meeting Program Award W

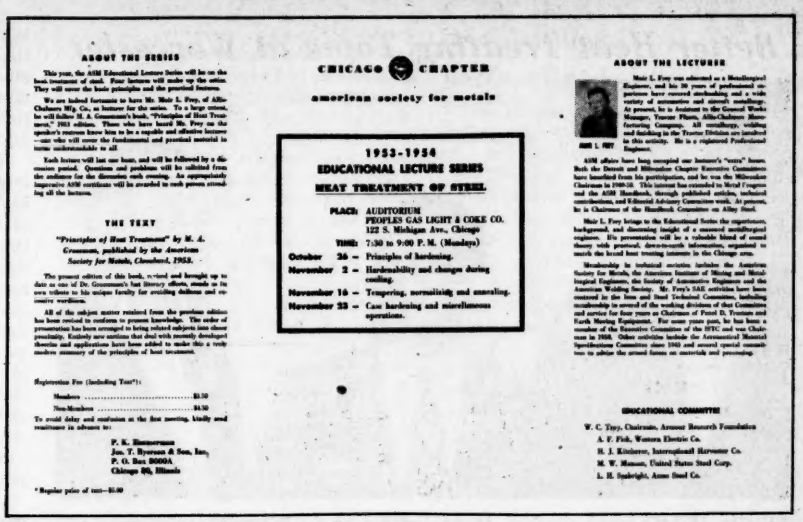


Winning Programs From Chapters With Fewer Than 500 Members Were: Third Place — Minnesota; Second Place — Toledo; First Place — Rocky Mt.

AMERICAN SOCIETY FOR METALS
MILWAUKEE CHAPTER
TECHNICAL DISCUSSION
"SELECTION AND SPECIFICATION OF STEELS"
Best Practice For Everyday Heat Treating
FALL EDUCATIONAL LECTURE SER
October 19 and 26, November 2, 9 and
The William Park Woodside Lecture
OCTOBER 12, 1953
BACKMAN MEMORIAL BUILDING, DETROIT

Programs Submitted by Chapters With a Membership of Over 500 Were: First Place — Milwaukee; Second Place — Los Angeles; First Place — Detroit

d Winners



ABOUT THE SERIES

This year, the ASM Educational Lecture Series will be on the heat treatment of steel. Four lectures will make up the series. They will cover the basic principles and the practical business.

We are indeed fortunate to have Mr. Nate L. Frey, of Allis-Chalmers Mfg. Co., as lecturer for the series. To a large extent, he will follow H. A. Grossman's book, "Principles of Heat Treatment," 1953 edition. Those who have heard Mr. Frey on the speaker's rostrum know him to be a capable and effective lecturer — one who will cover the fundamental and practical material in terms understandable to all.

Each lecture will last one hour, and will be followed by a discussion period. Questions and problems will be collected from the audience for the discussion each evening. An appropriately impressive ASM certificate will be awarded to each person attending all the lectures.

THE TEXT

"Principles of Heat Treatment" by H. A. Grossman, published by the American Society for Metals, Cleveland, 1953.

The present edition of this book, revised and brought up to date as one of Dr. Grossman's last literary efforts, stands as its own tribute to his unique faculty for avoiding dullness and excessive wordiness.

All of the subject matter retained from the previous edition has been revised to conform to present knowledge. The order of presentation has been arranged to bring related subjects into closer proximity. Entirely new sections that deal with recently developed theories and applications have been added to make this a truly modern summary of the principles of heat treatment.

Registration Fee (including Text*):

Members $3.50
Non-Members $4.50

To avoid delay and confusion at the first meeting, kindly send remittance in advance to:

P. K. Hunsicker
Jos. T. Ryerson & Son, Inc.
P. O. Box 80004
Chicago 80, Illinois

* Regular price of text—$5.00

CHICAGO CHAPTER

american society for metals

1953-1954
EDUCATIONAL LECTURE SERIES
HEAT TREATMENT OF STEEL

PLACE: AUDITORIUM
PEOPLES GAS LIGHT & COKE CO.
122 S. Michigan Ave., Chicago
TIME: 7:30 to 9:00 P. M. (Mondays)

October 26 — Principles of hardening.
November 2 — Hardenability and changes during cooling.
November 16 — Tempering, normalizing and annealing.
November 23 — Case hardening and miscellaneous operations.

ABOUT THE LECTURER

NATE L. FREY

Nate L. Frey was educated as a Metallurgical Engineer, and has 30 years of professional experience covered steel-making and a wide variety of automotive and aircraft metallurgy. At present, he is Assistant to the General Works Manager, Tractor Plants, Allis-Chalmers Manufacturing Company. All steelmaking, welding and finishing in the Tractor Division are involved in this activity. He is a registered Professional Engineer.

ASM affairs have long occupied one luncheon's "extra" hours. Both the Detroit and Milwaukee Chapter Executive Committees have benefited from his participation, and he was the Milwaukee Chairman in 1949-50. This interest has extended to Metal Progress and the ASM Handbook, through published articles, technical consultations, and 8 Editorial Advisory Committees work. At present, he is Chairman of the Handbook Committee on Alloy Steel.

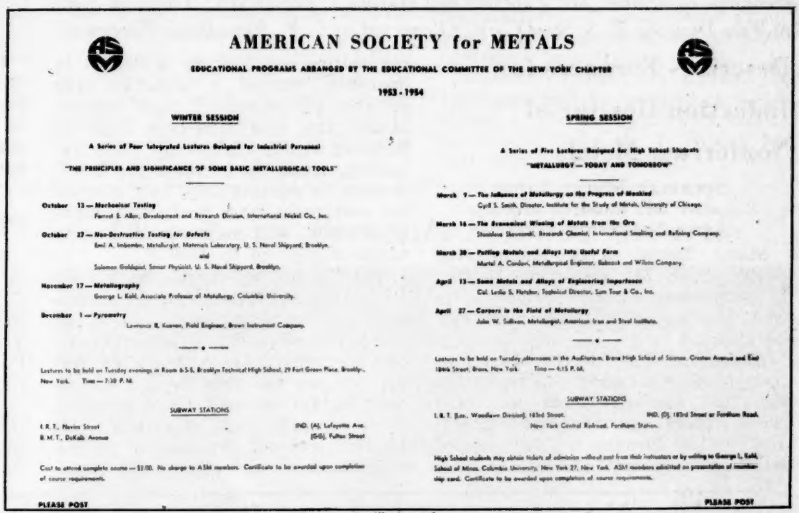
Nate L. Frey brings to the Educational Series the experience, background, and discerning insight of a seasoned metallurgical engineer. His presentation will be a valuable blend of sound theory with practical, down-to-earth information, organized to march the broad hour evening interests in the Chicago area.

Membership in technical societies includes the American Society for Metals, the American Institute of Mining and Metallurgical Engineers, the Society of Automotive Engineers and the American Welding Society. Mr. Frey's SAE activities have been centered in the Iron and Steel Technical Committee, including membership in several of the working divisions of that Committee and service for four years as Chairman of Panel D, Fracture and Forth Meeting Equipment. For some years past, he has been a member of the Executive Committee of the ISTC and was Chairman in 1950. Other activities include the Automotive Material Specifications Committee since 1940 and several special committees to advise the armed forces on materials and processing.

EDUCATIONAL COMMITTEE

W. C. Troy, Chairman, Armour Research Foundation
A. F. Fisk, Western Electric Co.
H. J. Kitchener, International Harvester Co.
M. W. Mansur, United States Steel Corp.
L. H. Spaleright, Asme Steel Co.

Chicago's Educational Lecture Series Program on "The Heat Treatment of Steel" Won First-Place Award for the Best Presentation of Material



AMERICAN SOCIETY for METALS

EDUCATIONAL PROGRAMS ARRANGED BY THE EDUCATIONAL COMMITTEE OF THE NEW YORK CHAPTER

1953 - 1954

WINTER SESSION

A Series of Four Integrated Lectures Designed for Industrial Personnel

"THE PRINCIPLES AND SIGNIFICANCE OF SOME BASIC METALLURGICAL TOOLS"

October 13 — Mechanical Testing
Parrel E. Allen, Development and Research Division, International Nickel Co., Inc.

October 27 — Non-Destructive Testing for Defects
Emil A. Imbembo, Metallurgist, Materials Laboratory, U. S. Naval Shipyard, Brooklyn.
and
Solomon Goldspiel, Senior Physicist, U. S. Naval Shipyard, Brooklyn.

November 17 — Metallography
George L. Kehl, Associate Professor of Metallurgy, Columbia University.

December 1 — Pyrometry
Lawrence R. Keenan, Field Engineer, Brown Instrument Company.

Lectures to be held on Tuesday evenings in Room 6-5-5, Brooklyn Technical High School, 29 Fort Green Place, Brooklyn, New York. Time — 7:30 P. M.

SUBWAY STATIONS

I. R. T., Nevins Street — IND. (A), Lafayette Ave.
B. M. T., DeKalb Avenue — (D-G), Fulton Street

Cost to attend complete course — $2.00. No charge to ASM members. Certificate to be awarded upon completion of course requirements.

PLEASE POST

SPRING SESSION

A Series of Five Lectures Designed for High School Students

"METALLURGY — TODAY AND TOMORROW"

March 9 — The Influence of Metallurgy on the Progress of Mankind
Cyril S. Smith, Director, Institute for the Study of Metals, University of Chicago.

March 16 — The Economical Winning of Metals from the Ore
Stanislaus Skowronski, Research Chemist, International Smelting and Refining Company.

March 30 — Putting Metals and Alloys into Useful Form
Martel A. Condon, Metallurgical Engineer, Babcock and Wilcox Company.

April 13 — Some Metals and Alloys of Engineering Importance
Col. Leslie S. Hatcher, Technical Director, Sam Tour & Co., Inc.

April 27 — Careers in the Field of Metallurgy
John W. Sullivan, Metallurgist, American Iron and Steel Institute.

Lectures to be held on Tuesday afternoons in the Auditorium, Bronx High School of Science, Creston Avenue and East 184th Street, Bronx, New York. Time — 4:15 P. M.

SUBWAY STATIONS

I. R. T. Jerome Avenue, Woodlawn Division, 183rd Street. IND. (D), 183rd Street or Fordham Road.
New York Central Railroad, Fordham Station.

High School students may obtain tickets of admission without cost from their instructors or by writing to George L. Kehl, School of Mines, Columbia University, New York 27, New York. ASM members admitted on presentation of membership card. Certificate to be awarded upon completion of course requirements.

PLEASE POST

New York's Educational Program, Printed on Buff Cardboard, Won a Third-Place Award, Based on the Clarity in Presenting Both Winter and Spring Series

The Meeting Program Award competition, which was announced in Secretary W. H. Eisenman's Report of Sept. 16, 1953, to Chapter Chairmen and Members of Executive Committees, has been inaugurated in an effort to stimulate chapter interest and attention in getting out more attractive meeting announcements. The winning programs illustrated on these two pages were taken from the meeting and educational notices for the month of October, and were judged on both their appearance and content, with an eye to their effectiveness in drawing more members to the meetings they publicized. A similar contest will be held for the January and a third for the March notices. Prizes of $25, $15 and $10 for first, second and third-place awards have been sent to the treasurers of the winning chapters in the following categories: Notices from chapters with over 500 members; from chapters with less than 500 members; and all educational lecture programs, regardless of number of chapter members.

EDUCATIONAL COURSE
"METALLURGY AT WORK"

November 2

Subject: "Metallurgy at Work in Industry"
Speaker: Dr. Max Hansen, Manager, Metals Research, Aluminum Research Foundation of Aluminum Institute of Technology.

November 9

Subject: "Metallurgy at Work in the Forge Shop"
Speaker: Dr. E. E. Dixon, Vice President in Charge of Metallurgy and Research, Ladish Co., Cudahy, Wisconsin.

November 16

Subject: "Metallurgy at Work in the Foundry"
Speaker: Mr. F. C. Hoyt, Manager, Technical Service Division, Russell Electric Company, Chicago, Illinois.

November 23

Subject: "Metallurgy at Work in Fabrication"
Speaker: Mr. Arnon L. Schoettler, Metallurgist, Welding Research, Allis-Chalmers Manufacturing Company, Milwaukee.

November 30

Subject: "Metallurgy at Work in Engineering"
Speaker: Mr. A. F. Fisk, Metallurgical Engineer, Timken Roller Bearing Company, Steel and Tube Division, Canton.

IMPORTANT

EDUCATIONAL PROGRAM COMMITTEE

MONTHLY TECHNICAL PROGRAM

PROGRAM COMMITTEE

The Second-Place Award in This Group Was Won by Milwaukee

Better Heat Treating Topic at Worcester

"Better Heat Treating" Was Discussed by E. J. Pavesic, Director of Research, Lindberg Steel Treating Co., at a Meeting of the Worcester Chapter. Shown are, from left: Lester M. Stern, North American Manufacturing Co., technical chairman; Mr. Pavesic; and Harold J. Elmendorf, American Steel & Wire Division, U. S. Steel Corp. (Reported by C. W. Russell for Worcester)

Describes Furnaces for Induction Heating of Nonferrous Metals

Speaker: Mario Tama
Secretary and Research Engineer
Ajax Engineering Corp.

Mario Tama, Ajax Engineering Corp., spoke on "Induction Melting of Nonferrous Metals" before a recent meeting of the Mahoning Valley Chapter.

Internal heating of the charge by induced electric currents distinguishes induction furnaces from all other types. There are two basic types: The coreless furnace, usually powered by high-frequency current, is used for melting and heating, is flexible in operation, simple in structure and suitable for extremely high temperature; the iron core-type furnace, powered with low frequency (line frequency, usually 60 cycles in the U.S.), is used for melting only, best adapted for continuous mass production, highly efficient, and presently limited to temperatures up to 2500°F.

With a history dating back over 50 years, the low-frequency induction furnace first found widespread use in the early 1920's in the production melting of brass. The Ajax-Wyatt furnace has long been predominant in that industry the world over. More recently, further developments of this general type, such as the Ajax-Scomet and the Ajax-Tama-Wyatt types, have opened many new fields in melting aluminum, copper, zinc and their alloys. The rate of progress is illustrated by installation of about 1000 low-frequency induction furnaces since 1945.

The main characteristics of the low-frequency type, internal heating, high efficiency and electromagnetic circulation, lead to one or more of the following advantages over traditional furnaces, depending on the application: uniformity of alloy, control and uniformity of temperature, low metal loss, comfortable working conditions, low power costs, low maintenance cost, elimination or reduction of contamination by container or atmosphere, as well as automatic pouring.

Among the many new fields of application so far have been:

Aluminum—Die casting, melting of fine scrap, continuous casting, aluminum coating of steel.

Copper — Production of OFHC (oxygen - free high - conductivity) grade, billet casting, large scale continuous casting of brass and copper.

Zinc—Die casting, and galvanizing.

Production rates of individual units have been roughly tripled (reaching sometimes 3-5 ton per hr.) by use of multiple inductor designs.—**Reported by John D. Anderson for the Mahoning Valley Chapter.**

Plan Instrument Conference

The Instrument Society of America will hold its ninth Annual Regional Conference on Wednesday, Feb. 4, 1954, at the Hotel Statler in New York City. Four separate groups, Power, Process, Medical and Aviation, will present papers on "Progress in Measurement". Further information can be obtained by writing to: Les Butzman, Swartwout Co., 103 Park Ave., New York, N. Y.

New Jersey Students Receive Science Awards

Two Paterson, N. J., Students Received Science Achievement Awards at Ceremonies Held Recently at St. John's Cathedral High School. Donald McNaboe, a senior at the school, and Rimantis Glemza, a former student now at Rutgers College of Pharmacy, were given awards for their projects, "Proper Methods of Riveting Aluminum to Prevent Electrolytic Corrosion", by McNaboe, and "Effect of Tannic Acid on Iron as a Preventive Against Rust", by Glemza. Shown at the presentation are, from left: Rev. Thomas Boyle, director of the school; Glemza; Sister Mary Virginia, science teacher; McNaboe; W. Hughes White, chairman of the New Jersey Chapter; and Rt. Rev. Msgr. Walter H. Hill, rector of St. John's Cathedral

Describes Research Work Done on Metal Surface Reactions

Speaker: F. W. Young, Jr.
University of Virginia

"Metal Surface Reactions", a talk by F. W. Young, Jr., research associate in chemistry, University of Virginia, was the topic at a recent meeting of the Baltimore Chapter.

Dr. Young described the studies on the surface reactions on metal single crystals being carried out at the University of Virginia. A special method of study using large single crystals of metals has been developed whereby the individual crystal faces may be identified and the rate of reaction on each face measured. The crystals are first grown in the form of a rod, ½ to 1 in. in diameter, from which either spheres exposing all possible faces or slices exposing one particular face may be cut. The strained layer is removed and a smooth surface is obtained by mechanical and electrolytic polishing. The specimen is generally heated in hydrogen at 500° C. in order to remove any oxide on the surface prior to reaction.

The influence of crystal face on about 10 types of surface reactions with a dozen different metals, including copper, nickle, iron and silver, has been studied. For example, one face of a copper crystal has been found to oxidize at 200° C., at least five times faster than another face. One particular catalytic reaction has been found to take place at least 1000 times more rapidly on one face of a nickel crystal than on another. When a copper crystal is immersed in certain types of oil at 175° C. and then removed, oil drops will remain on certain faces while other faces will be perfectly dry. When copper is electroplated at a low current density on a single crystal of copper in the form of a sphere, the sphere is converted into a polyhedron. Friction and wear have also been found to vary with crystal face.

Dr. Young concluded his talk with a color movie, taken at regular camera speeds, in which a copper single crystal was processed through the different stages outlined. In the movie, the various planes could be seen as they became visible and the oxidation progressed.

The work being done through this research project may become the basis for a more thorough understanding of the surface reactions of metals.—**Reported by Lewis H. Gross for the Baltimore Chapter.**

Heat Treating Panel Meets at Rhode Island

The Rhode Island Chapter held a Stump the Experts meeting recently. A panel of experts answered questions on "Heat Treating", helping to solve some of the problems brought up during the evening.

Members of the panel included Carl G. Johnson, Presmet Corp.; Walter M. Saunders, Jr., Walter M. Saunders Laboratory; George Durst, Metals and Controls Corp.; W. A. Schlegel, Carpenter Steel Co.; and James H. Hinman, Revere Copper & Brass, Inc. Frank P. Gilligan, Henry Souther Engineering Co., was the moderator of the panel.—**Reported by Warren M. Hagist for the Rhode Island Chapter.**

A. O. Smith Adds Subsidiary

The A. O. Smith Corp., Milwaukee, has recently purchased Glascote Products, Inc., of Cleveland, Ohio, manufacturer of glass-coated equipment for the chemical and chemical processing industries.

Glascote, which was founded 35 years ago, will be operated as a subsidiary of the Smith Corp., retaining its present name. L. T. Hickey has been named vice-president.

University Schedules Short Course on Metals

The University of Nebraska, Lincoln, is planning a Conference on Metals, to be held Feb. 15 and 16, 1954. The program is being sponsored by the College of Engineering in cooperation with the local chapters of the American Foundrymen's Society, the American Society of Tool Engineers and the Associated Industries of Nebraska.

Topics of current, practical interest to companies in the area have been selected for the course. Talks on "Nodular Iron", "Effects of Additive Elements in Cast Iron", "Heat Treating Equipment", and "Problems in the Use of Nonferrous Castings" will be included.

Akron Hears Talk on High-Temperature Metals

Speaker: C. T. Evans
Universal-Cyclops Steel Corp.

C. T. Evans, manager of high-temperature metals, Universal-Cyclops Steel Corp., presented a talk on "Developments in High-Temperature Materials" before the November meeting of the Akron Chapter. Mr. Evans, who holds two patents on gas turbine materials and gas turbine rotors, delivered a highly interesting discussion of the history and probable trends of the high-temperature materials field.—**Reported by Richard E. Miller for the Akron Chapter.**

Oak Ridge Presents Science Award

W. D. Manly, Oak Ridge Chairman, Is Shown Presenting an Honorable Mention Award to Miss Jennifer Tipton of Central High School, Fountain City, Tenn., for Her Project "Tracking Down Alpha Particles" in the Science Achievement Awards Program. The Chapter made an additional gift of a silver bracelet to the girl. In an active program to stimulate interest in the Science Achievement Awards, the Chapter is circulating membership lists to science teachers so students can call on members for aid in their projects; giving talks at science group meetings; assisting vocational counselors; and drawing up lists of subjects to be considered for award projects. (Reported by William D. Manly for the Oak Ridge Chapter)

Cites Importance of the Clad Metals

From Left: Walter L. Keene, Superior Steel Corp., Spoke on "Clad Metals" Before the New Haven Chapter Recently. E. W. Lovering, vice-chairman, and R. P. Nevers, chairman, await their chance for a chat with Mr. Keene

Speaker: Walter L. Keene
Superior Steel Corp.

Walter L. Keene, director of research and metallurgy, Superior Steel Corp., delivered a talk entitled "An Introduction to Clad Metals", before a large group at a meeting of the New Haven Chapter.

Mr. Keene pointed out that the entire world was dependent on about 20 metals used either in their pure state, alloyed with each other or combined with each other. No one metal possesses all the virtues required by industry. To overcome this shortcoming, man has alloyed and combined metals.

Combined metal is a generic term which embraces composite, coated or clad metals. Specifically, clad metals are those which consist of two or more metallic components, the smallest being at least 5% of the total mass, the components arranged in layers with the smaller generally at a surface, inseparably bonded in a rolled product.

One of the fundamentals in the cladding field is that clean surfaces be placed face to face. Even though it may be invisible, if a thin layer of oxide exists on one of the metals, it can prevent bonding.

Factors to be considered in successful bonding of dissimilar metals by hot rolling are: Their degree of compatibility with regard to rolling temperature; whether or not they can be rolled at all; and hot hardness and thermal expansion. The two or more layers of a clad metal which is composed of inherently ductile components properly bonded together cannot be separated by physical means short of complete destruction. Clad metals can be drawn, spun, rolled, bent, twisted, heated and quenched, upset, punched or otherwise formed provided proper precautions have been taken to insure ductility at the bond line. Mr. Keene stated that there were five principal systems of cladding in use today: pressing, casting, direct rolling, sintering and deposition. There are many variations of each system but if a rolling operation is involved in the processing, they were included in the discussion.

The speaker described in some detail each method of cladding and listed many applications for this product.—**Reported by Glenn F. Whiteley for the New Haven Chapter.**

Action in Openhearth Theme of Austin Talk

Speaker: James B. Austin
Director of Research Laboratory
U. S. Steel Corp.

The Cleveland Chapter's National Officers' Night meeting honored J. B. Austin, national president of the Society and director of the research laboratory, United States Steel Corp., and W. H. Eisenman, executive secretary. Mr. Eisenman posted the Chapter on national affairs of the Society, told of the participation of the Society in scientific scholarship awards to students, and presented various facts and figures on the recent highly successful Metal Show and Congress.

Dr. Austin gave an excellent talk on "Action in the Openhearth". He described some of the main processes which occur during openhearth operations. The importance of maintaining very active ore and lime boils to reduce bath temperature gradients, control of the oxidation of carbon, and to aid in the removal of impurities, including nitrogen and hydrogen, was stressed. Without ore and lime boils, the temperature gradient in the slag cover would have to be 2000° F. per in. of slag to maintain proper bath temperature. Removal of nitrogen and hydrogen is partially accomplished by diffusion into bubbles of the boil. Dr. Austin indicated that rough surfaces of unmelted metal, rough refractory lining, scrap charge and lime charge increase boiling activity.

The talk was supplemented with a high-speed color moving picture film of an openhearth bath during operation. The film portrayed the bubbling and stringers of slag and metal ejected into the air above the bath during the ore and lime boils. —**Reported by J. B. Wilson for the Cleveland Chapter.**

Compliments

To PHILIP M. MCKENNA, president of Kennametal, Inc., Latrobe, Pa., who received the American Society of Mechanical Engineers' Holley Medal Award at the Society's annual meeting in November. Mr. McKenna received the medal for his research, development and application of cemented carbide compositions which have contributed to the science of metal cutting.

♦ ♦ ♦

To JAMES PRIESTLEY GILL on his recent election as president of the Vanadium Alloys Steel Co., and also Vanadium Alloys Steel Canada Ltd., and to BURNS GEORGE who was elected a director on the Board at Vanadium Alloys Steel Co., Latrobe, Pa.

♦ ♦ ♦

To ANTONIO SCORTECCI, director of Istituto Siderurgico "Finsider" and professor of metallurgy at the University of Genoa, on his recent award by the French government of the Legion of Honor, the highest award of the French and one seldom bestowed on anyone other than a Frenchman, for his achievements in science, particularly in metallurgy.

♦ ♦ ♦

To METALS REVIEW. Bouquets and accolades are tossed our way every day. *Metals Review* gets its share of these very desirable pitches, but when nice words come from one of the top engineers at Ford Motor Co., we like to hold up our banner. G. M. Kerr, supervisor, production tool standards, Ford Motor Co. of Canada, Ltd., says very frankly *"Metals Review* fills a very basic need for the fabricating industry". Thanks very much, Mr. Kerr!

The Atom Goes to School

North Carolina State College's nuclear reactor, the first in the country to be owned by a college, is going into operation soon. The reactor will supply experience to students in nuclear engineering, a course started by the college in 1950. The reactor will be fueled with fissionable uranium-235 loaned by the Atomic Energy Commission.

LaQue Speaks on Galvanic Corrosion at New Jersey Meeting

Speaker: F. L. LaQue
International Nickel Co.

Frank LaQue, International Nickel Co., introduced the film "Corrosion in Action" at the New Jersey Chapter's November meeting with the remark that it had been made to keep him from talking. Actually the film served as a background for a discussion of "Corrosion Problems".

"Corrosion in Action" was prepared by the International Nickel Co. as a teaching aid for use in universities and covers the basic principles of the

Frank LaQue

electrochemical theory. Divided into three reels, the film illustrates what makes metals corrode, the origin and characteristics of corrosion currents, polarization and the effects of passivation treatments.

Mr. LaQue interrupted the showing of the film at the end of each reel for a question and answer period. Discussing painted metal surfaces on which coverage was not complete, he remarked that for service under water, it would probably be safer to dispense with painting entirely than to risk the effects of galvanic corrosion concentrated at breaks in a coating on an anode material. The cathode also should be coated when paint is used to control galvanic corrosion.

On a question regarding the effect of surface finish, the speaker stated that a passive film forms more readily on a smooth than on a rough surface. It might be possible to reverse the polarity of two metals such as aluminum and iron which are close neighbors in the galvanic series but it is doubtful that such an effect could be achieved for metals as far apart as iron and copper.

He remarked that stresses within the elastic limit did not have much effect on over-all corrosion but stresses in the plastic range might rupture the surface film and cause increased corrosion. This effect probably occurs in an advancing crack during stress corrosion or fatigue.—**Reported by John L. Everhart for the New Jersey Chapter.**

Discusses Refractory Transition Metals

Robert I. Jaffee (Center), Battelle Memorial Institute, Talks With Peter Patriarca, Vice Chairman of the Oak Ridge Chapter, and Anton deS. Brasunas, Chairman of the Educational Series, After a Recent Meeting. Dr. Jaffee spoke on "Problems and Progress in Refractory Transition Metals"

Speaker: Robert I. Jaffee
Battelle Memorial Institute

The highlight of the October meeting of the Oak Ridge Chapter was a talk by Robert I. Jaffee of Battelle Memorial Institute on some of the particular problems encountered in research on the "Refractory Transition Metals". Among the refractory metals studied at Battelle are titanium, rhenium, vanadium, chromium and molybdenum.

The high cost of many refractory metals imposes a severe restriction on the size and number of test specimens. For this reason microtesting procedures have been worked out to determine tensile properties as well as the edge cracking limit, hot hardness, bend transition temperature and impact properties. If proper precautions were taken, very good correlation between macro and micro tests developed were observed at Battelle Memorial Institute.

The history of the line-marking problem in titanium was discussed. For some time titanium of highest purity has been produced by the thermal dissociation of the iodide. This grade of titanium almost invariably showed mysterious "line markings" which indicated a second phase. Chemical analyses did not reveal any impurities, which, in view of accepted solubilities, could account for this second phase. This was seemingly another of the annoying paradoxes often met in research. It was finally found in a research on titanium-hydrogen that the solubility of hydrogen dropped to a very low value at room temperature, and it was this observation which led to the solution of the problem.

A second problem discussed was rhenium fabrication. Unlike other materials, an increase in the purity of the metal did not result in better fabrication qualities. Oxygen pickup, however, did result in severe hot shortness. The metal also work hardened to a degree unparalleled by any other metal. The solution was to fabricate rhenium using low reductions of about 10%, followed by repeated anneals at 1700° F.

Brittleness of chromium was discussed by Mr. Jaffee. Here, as in rhenium, much work was done to produce very high purity chromium and to prevent impurity pick-up in heat treatment. Although bars of high purity chromium could be bent 180° at −25° C., it was found that the same metal had no tensile ductility at room temperature. Despite the improvements made in transition temperature, it was concluded from the results of the tests that chromium's brittleness was inherent.

Brittleness is also a problem in molybdenum. Although some ductility may be induced in this metal by cold work, it too is inherently brittle. Due to the high cost of molybdenum it cannot compete with other materials in structural applications unless it is used above 1700° F. At these temperatures it readily oxidizes. To prevent this oxidation, much research has been conducted to find suitable cladding materials. Nickel-base alloy claddings proved to be much better coatings than iron-base alloys. It was found that the useful temperature range of molybdenum is right in the middle of its recrystallization range. For this reason alloying elements such as titanium must be added to strengthen the material by preventing the recrystallization from occurring.—**Reported by J. L. Scott for the Oak Ridge Chapter.**

Heat Treating Theme at University Night

At Detroit Chapter's Annual University Night Meeting J. L. McCloud of Ford Motor Co. Presented a Talk Entitled "Heat Treating Has Changed". Above, from left, are: William Greaves, Packard Motor Car Co., technical chairman; Mr. McCloud; and T. E. Olson, Ohio Crankshaft Co., chairman

Speaker: J. L. McCloud
Ford Motor Co.

A capacity attendance of members and students were present at the Detroit Chapter's annual University Night to hear J. L. McCloud, manager of manufacturing research, Ford Motor Co., lecture on the subject "Heat Treating *Has* Changed".

Mr. McCloud, who recently completed his 38th year with the Ford Motor Co., recalled the major steps in the progress of heat treating, beginning with the "blacksmith" era and the eventual founding of the first metal treaters association in Detroit. This organization, originally called the Steel Treaters Research Society, later merged with its Chicago counterpart to form the American Society for Steel Treating, later to become the A.S.M.

He pointed out that heat treating as done by the old-timers was strictly an art and practical experience was the only way by which one broke into heat treating. As new developments in the technical knowledge of heat treatment and the equipment improved, heat treating became a science.

Great progress in heat treating was made with the use of pyrometry. The development of improved furnace alloys enabled the continuous furnace to gain prominence and further advance heat treating.

Metallurgy was continually becoming more complex as the many research activities introduced the heat treater to atmosphere controlled furnaces and salt bath treatments such as martempering and austempering. Localized heat treatment through the use of induction and flame heating was another development of the past 30 years. Other major factors in advancing heat treatment were the concept of hardenability and the time-temperature-transformation curves.

Throughout his talk Mr. McCloud related many humorous anecdotes from his own personal experiences. As expressed by him, "a backward look such as this enables us to look ahead at the increased opportunities of the future".

At the dinner meeting preceding the lecture the Detroit Chapter honored Professor C. Upthegrove, retiring professor of metallurgical and chemical engineering of the University of Michigan. The Chapter and the U. of M. alumni presented Prof. Upthegrove with a television set. Senior metallurgical students from five Michigan colleges and universities were dinner guests.—**Reported by Larry V. Marchetti for the Detroit Chapter.**

Savannah River Chapter Holds First Meeting

The recently organized Savannah River Chapter A.S.M. held its first meeting in Augusta, Ga., during November.

Temporary officers elected to fill chapter posts were: Glenn Wensch, U. S. Atomic Energy Commission, chairman; Charles D. Smith, Savannah River Laboratory, vice-chairman; L. A. Abrams, secretary; R. R. Herries, treasurer, Philip Permar, Savannah River Laboratory, Thomas C. Evans, E. I. du Pont de Nemours & Co., Paul J. Hagelston, U. S. Atomic Energy Commission, and W. G. Voorhees and J. R. Driear, Savannah River Laboratory, members of the Chapter's executive committee.

After the temporary slate of officers had been voted in, a short technical meeting featuring the movie "This Is Steel" was shown. Thirty-four members and 16 guests attended this initial meeting of A.S.M.'s newest chapter.—**Reported by Leonard A. Abrams for the Savannah River Chapter.**

Ipsen Opens Detroit Office

Due to greatly increased sales in the Michigan-Indiana territory, Ipsen Industries, Inc., manufacturers of automatic heat treating equipment, has announced the opening of a new sales and service division in Detroit.

The decision to establish a Michigan sales and service headquarters was based on the rapidly growing demand for Ipsen equipment in this area and the desire to provide maximum maintenance facilities and service to Ipsen users and prospective customers.

Tells Texas How Strain Gages Work

Francis C. Tatnall, Baldwin-Lima-Hamilton Corp., Spoke on "Relationship Between Metallurgy and Engineering" at a Meeting of the Texas Chapter. Above, from left, are: A. R. Oakley, Jr., vice-chairman; W. McKnight, from Baldwin-Southwark; Mr. Tatnall; and W. Mack Crook, chairman. Mr. Tatnall discussed several applications of strain-gages and strain measuring instruments. (Reported by C. L. Horn — Photograph by Lee Dolan)

Outlines Growth Of Applications of Titanium Alloys

Speaker: R. S. Nycum
Titanium Metals Corp. of America

The Calumet Chapter heard R. S. Nycum of the Titanium Metals Corp. of America speak on the "Significance and Trend of Titanium Development".

Mr. Nycum traced the development of titanium metal and titanium alloys, the sources of titanium and the prodigious growth of the industry in the past few years. Even with this growth the demand has far exceeded the supply and new applications for this light, strong, corrosion resistant metal await only a better supply.

Because of titanium metal's high strength-to-weight ratio it finds many applications in the aircraft industry as compressor blades in jet engines and other highly stressed parts. The strength of titanium metal and titanium alloys may range between 85,000 and 150,000 psi. ultimate strength, depending upon the manner of fabrication, with the yield strength running as high as 90 to 95% of the ultimate.

The corrosion resistance of titanium metal is higher than that of either aluminum or stainless steel and thus finds a high acceptance in the chemical industry. The medical profession finds use for this metal in surgical appliances because it is inert to body acids. It is not, however, considered particularly suited to high-temperature applications and strength falls off rapidly as temperature is increased. The top service temperature of presently available titanium-base alloys is around 700° F.

Titanium metal and alloys have been forged, rolled, machined and cold worked successfully. Molten titanium requires exceptional care in casting since it readily absorbs oxygen and reacts rapidly with commonly used mold materials. In hot working it has a narrow working range, 1500 to 1700° F. Heating above 1750° F. causes a heavy tightly adhering scale to form which is almost impossible to remove. Machining is most easily done at slow speeds with positive feeds on heavy equipment to eliminate tool chatter.

Mr. Nycum discussed the four companies in this country currently engaged in the manufacture of titanium metal. Aside from the actual production of titanium ingots the forging, rolling and drawing is done on conventional mill equipment. Tubing is produced by extrusion.

Mr. Nycum displayed specimens of titanium rod, sheet, wire, tubing and foil and several parts machined or formed from the metal.—**Reported by K. R. Hine for Calumet Chapter.**

Talks on Magnesium at Carolinas Meeting

Shown at the Joint Meeting of the Carolinas Chapter A.S.M. and the North Carolina Eastern Section A.S.M.E. Are, From Left: A. R. Fairchild, A.S.M. Chairman; S. C. Donnelly, Superintendent of the Burlington Shops, Western Electric Co., where the Meeting Was Held; A. W. Winston, Sr., Technical Speaker; R. Holland, A.S.M.E. Chairman; and J. Joseph, Western Electric Co.

Speaker: Arthur W. Winston, Sr.
Dow Chemical Co.

The Carolinas Chapter A.S.M. held a joint meeting with the North Carolina Eastern Section of the A.S.M.E. recently. Arthur W. Winston, Sr., of Dow Chemical Co., presented an interesting discussion on "Magnesium—Our Lightest Structural Metal".

He stated that magnesium was developed commercially in Germany about 1905 and used in World War I for flares and in similar applications. In 1915 the production of primary magnesium was begun in the United States. In 1918 there were five producers, but three had dropped out by 1920, and in 1927 one of the remaining companies stopped production, leaving the Dow Chemical Co. as the sole producer of magnesium in this country. In 1920 Dow began to look around for commercial uses for magnesium and one of the first tried was for auto engine pistons.

In 1926 Dow began basic studies of magnesium alloys for structural uses. To date about 60,000 compositions have been studied, many of which were aluminum, zinc and zirconium, and particularly castings and extrusions made of these alloys. In 1932 the production of sheet magnesium was begun, and this year a large rolling mill is being built by Dow in Madison, Ill., to reduce the cost of producing sheet magnesium and to bring it more in line with competitive metal costs.

Mr. Winston stated that magnesium was now in competition with aluminum in the field of extrusions. It is an inexhaustible primary metal since it is now obtained from sea water. In 1933 the use of magnesium in making aircraft wheels, brackets, engine castings, etc. was initiated. During the war it was widely used in sand castings, forgings and die castings, largely in aircraft. In 1947 it began to be more widely used in helicopters, military aircraft, dock boards, etc., in the form of sheet and extrusions. Magnesium is readily welded by the heliarc process.

At present, Dow is the only producer of the primary metal. Last year 140 million lb. of magnesium were produced, 90 million lb. being used and the balance turned over to the government stockpile. At its present price of .27 per lb., magnesium is the cheapest metal by volume other than cast iron. Mr. Winston cited the prediction by the President's Materials Policy Commission that production and use of magnesium would increase 180% by 1975.

Mr. Winston concluded his talk by showing slides of various uses of magnesium and a movie of the Dow Chemical Co.'s Texas plant which showed how magnesium is made from sea water.—**Reported by James J. Hairston for the Carolinas Chapter.**

New York Science Awards

The third annual contest sponsored by the National Science Teachers Association within secondary schools was concluded with the awarding of 52 prizes in the Metropolitan New York City area. A first prize in the seventh and eighth-grade group went to Paul Brest, Riverdale Day School, for his paper entitled "The Synthesis of Ammonia". Two second prizes and 29 honorable mention awards were also made.

In recognition of the New York Chapter's interest in this important project, Chairman Neil Russell has participated in several award ceremonies. As a further expression of the Chapter's interest, Samuel Schenberg, supervisor of science, New York City Board of Education, and Louis Gorman, a senior at Theodore Roosevelt High School, who won an honorable mention for his paper on "The Cyclotron", were present at the last meeting of the Chapter.—**From New York Chapter's *Reporter*, Vol. 1, December 1953.**

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Akron	Feb.	Mayflower Hotel		Dance
Baltimore	Feb. 15	Engineers' Club	G. V. Smith	Creep of Metals
Boston	Feb. 5	Hotel Shelton	Panel	Heat Treating Equipment
Buffalo	Feb. 11	Hotel Sheraton	Peter Payson	Hardenability of Steels
Calumet	Feb. 9	Phil Smidt's	F. R. Gillies	Executives' Night
Carolinas	Feb. 18	Charlotte, N. C.	Horace Knerr	A.S.M. and Its Relation to Chapter's Work
Cedar Rapids	Feb. 9	Roosevelt Hotel	H. B. Knowlton	Selection and Heat Treating of Steels
Chicago	Feb. 8	Furniture Mart	H. G. Replogle	How to Buy Toolsteel
Cincinnati	Feb. 11	Eng. Soc. Hqd.		Joint Meeting With A.W.S.
Cleveland	Feb. 1	Hollenden Hotel	F. Frary	Aluminum Research in Cleveland
Columbus	Feb. 6	Broad St. Christian Church	H. M. Goldman	Metal Cleaning and Finishing by Chemical Methods
Dayton	Feb. 10	Engineers' Club	F. W. Less	Shell Molding
Detroit	Feb. 8	Rackham Mem. Bldg.	J. B. Austin	Maghification in Time
Eastern New York	Feb. 9	Panetta's	J. P. Gill	Heat Treatment
Fort Wayne	Feb. 8	Howard Johnson's	M. W. Lightner	Trends in Steelmaking
Georgia	Feb. 2	Georgia Tech	Frank Johnson	Picking Today's Boss in the Metalworking Industry
Golden Gate	Feb. 8	El Curtola	G. A. Fritzlen	Corrosion and Hard Facing Materials
Hartford	Feb. 9	Indian Hills Country Club	Peter Payson	Hardenability of Steel
Indianapolis	Feb. 15	McClarney's	T. J. Dolan	Experimental Stress Analysis
Kansas City	Feb. 17	Fred Harvey's	Charles Hood	Lubrication and Its Uses
Lehigh Valley	Feb. 5	Hotel Traylor	J. Juppenlatz	Progress in Steel and Alloy Casting
Louisville	Feb. 2	5 and 1 Club	C. A. Black	Particle Accelerators and Radioactive Isotopes
Mahoning Valley	Feb. 13	V.F.W.		Ladies Night—Valentine Party
Milwaukee	Feb. 16	City Club	J. R. Willard	What's New in Aluminum
Minnesota	Feb. 18	Covered Wagon	K. L. Fetters	Steelmaking, Production or Research
Montreal	Feb. 1	Queens Hotel	L. A. Forsythe	Presidents' Night
New Haven	Feb. 18	Hotel Elton, Waterbury	J. T. Lumis	Recent Advances in Continuous Casting
New Jersey	Feb. 15	Essex House	O. J. Horger	Why Metals Fracture
New Orleans	Jan. 29	New Orleans Country Club	J. B. Austin	Metals of Tomorrow
New York	Feb. 5	Hotel St. George		Stag Smoker
North Texas	Feb. 4	Engineers Club	J. B. Austin	National Officers Night
Notre Dame	Feb. 10	Engineering Bldg.	A. F. Underwood	Fatigue
Oak Ridge	Feb. 17	K. of C. Hall	J. B. Austin	Magnification in Time
Ontario	Feb. 5	Hamilton	John Convey	Association of Metallurgy With the Atomic Energy Project
Oregon	Feb.	Congress Hotel	T. R. Lichenwalter	Fabrication of Stainless Steel Equipment
Ottawa Valley	Feb. 2	P.M.R.L.	R. A. Dunn	Uses of Atmospheric Gases
Penn State	Feb. 9	Elec. Eng. Bldg.	B. H. Alexander	Germanium
Peoria	Feb.	Morton, Ill.	Alfred Amorosi	Industrial Applications of Atomic Energy
Philadelphia	Feb. 26	Engineers' Club	W. B. Pierce	Steel Horizons
Philadelphia—Junior Section	Feb. 12	Engineers' Club	Harold Hovis	Fundamentals of Heat Treatment and Applications in Small Parts Testing
Pittsburgh	Feb. 11	Ft. Pitt Hotel	E. E. Thum	New Metals
Purdue	Feb. 16	Purdue Mem. Union	Sam Wenk	Nondestructive Testing
Rhode Island	Feb. 3	Eng. Soc. Bldg.	G. S. Bennett	Ultrasonics
Rochester	Feb. 8	C. of C.	J. E. Burke	Metallurgical Problems in Atomic Energy
Rockford	Feb. 24	Faust Hotel		Cermatics
St. Louis	Feb. 19	Forest Park Hotel	A. S. Cross, Jr.	Joining of Metals by Brazing
Saginaw Valley	Feb. 16	Frankenmuth	W. A. Reich	Cemented Carbides
Savannah River		Commercial Hotel Aiken, S. C.	Frank Foote	Experimental Reactors
Springfield	Feb. 15	Blake's Restaurant	C. A. Mueller	Controlled Atmospheres
Syracuse	Feb. 2	Onondaga Hotel	I. W. Burr	Control in the Metallurgical Industries
Terre Haute	Feb. 8	Y.M.C.A.		Foundry Practice
Texas	Feb. 2	Ben Milam Hotel	J. B. Austin	Magnification in Time
Tri-City	Feb. 2	Rock Island Arsenal	F. E. Harris	Trouble Shooting in Heat Treat Problems
Tulsa	Feb. 5	Michaelis Cafe	J. B. Austin	Metals of Tomorrow
Utah	Feb. 25	Salt Lake City	W. H. Eisenman	National Officers Night
Warren	Feb. 11	El Rio Restaurant	H. M. McDaniels	Plastics
Washington	Feb. 8		R. F. Mehl	Burgess Memorial Lecture—Formation of Ferrite From Austenite in Hypoeutectoid Steels
Western Ontario	Feb. 12	Cobblestone Inn, London	H. G. Warrington	Canadian Magnesium in World-Wide Applications
Worcester	Feb. 10	Hickory House	Richard Preston	Economic Developments in Massachusetts
West Michigan	Feb. 15	Lock's Restaurant	John Parina, Jr.	Metallic Coatings
Wichita	Feb. 16	K. of C. Hall	A. J. Langhammer	Powder Metallurgy
York	Feb. 10	York, Pa.	C. A. Zapffe	Fractology

Panel Discusses Hot Forming of Metals

J. Succop (Left), Technical Chairman of the November Meeting at Pittsburgh, Is Shown With Speakers Who Discussed "New Methods of Hot Forming Metals". Right of Mr. Succop are: E. Clark, Ghambersburg Eng. Co.; A. J. Pepin, Wyman-Gordon Co.; and G. Hanke, Allegheny-Ludlum Steel Corp.

Speakers: E. Clark
A. J. Pepin
G. Hanke

At Pittsburgh Chapter's November meeting 350 guests heard Fred Hallford, special agent in charge of the Pittsburgh office of the Federal Bureau of Investigation, give some interesting sidelights on the activities of the F.B.I. and facts about its organization and responsibilities.

At the technical meeting a panel of three speakers discussed "New Methods of Hot Forming Metals". Gil Hanke, Allegheny-Ludlum Steel Corp. spoke about new hot extrusion equipment at the company's Watervliet, N. Y., plant.

Mr. Hanke gave a description of the Ugine-Sejournet extrusion process, developed in France, which uses a 1770-ton press installed in 1950. The auxiliary equipment and press were shown on slides while some of the problems with glass lubricant, die life and such critical features as press alignment, ram deflection and billet stock were discussed. The process is used for extruding light-walled tubing of stainless steel high-temperature alloys, titanium and zirconium. Normal product is produced in 30 to 35 ft. lengths to a tolerance of ±.010 in. on section. Shapes, angles, flats, channels and splined bars have been produced. Intricate sections can be prepared with this press at lower over-all cost per ton than with rolls, since, in some cases, rolls would not be justified by low tonnage and it might even be impractical to roll the section.

A. J. Pepin, assistant vice-president of Wyman-Gordon Co., described the application of an 18,000-ton press in forging aluminum, magnesium, stainless, and alloy steels and titanium. This press, installed in 1946, will be overshadowed by two new presses of 35,000 and 50,000-ton capacity which will be ready for use in 1955. Huge landing gear and airframe parts now prepared in two separate forgings will be redesigned for production as a single unit when the new equipment is available.

Mr. Pepin stressed the importance of top-quality aircraft materials for use on the huge press. His talk was an account of his company's pioneering in a remarkable industry.

Eugene Clark of the Chambersburg Engineering Co., described the new method of forming metals in midair with two movable dies which strike the stationary blank in midair.

An excellent movie of the Chambersburg process in operation at a silver flatware plant and in forging turbine buckets was shown.

Extensive use of electronic equipment makes accurate and complete control of the forging operation possible. —**Reported by H. E. McGannon, for the Pittsburgh Chapter.**

Past Chairmen Meet in Worcester

Present at Worcester Chapter's Past Chairmen's Night Held Recently Were, From Left: Paul F. Pfau (1942-43); Carroll C. Tucker (1937-38); William Hague (1930-31); W. C. Searle (1925-26); Carl G. Johnson (1929-30); R. A. Johnson (1944-45); Wendell J. Johnson (1952-53); Leo P. Tarasov (1948-49); and Lloyd G. Field (1947-48). (Reported by C. W. Russell.)

deVore Discusses the Cold Extrusion Process

Speaker: Weber de Vore
Heintz Manufacturing Co.

Members of the Tri-City Chapter heard Weber de Vore talk on "Cold Extrusion of Steel" in November.

The speaker described the process as "cold shaping". He used slides to illustrate the principles used in forward and backward extrusion processes and the differences between such work and conventional press operations such as drawing, coining, etc.

Weber de Vore

The various stages of the process were explained. The lubricant coating applied, which permits the metal to flow over the dies and punches, is a very important factor, as is the design of the punches and dies. Machine tools consist mainly of large mechanical presses.

The advantages of the process are to be found in the considerable saving in material used in comparison with hot work jobs, the reduction in finish machine work required, increase in tool life and the improvement in the mechanical properties of the metal through cold working, such that heat treatment operations are sometimes not needed.

Mr. de Vore stated that while cold shaping got its original start in Europe, his observations on recent trips there were that the process is moving ahead much faster in this country at the present time. The reason for this is that we have the larger amounts of capital resources needed to provide necessary machines and tools, as well as large quantity requirements.

A 155 mm. shell projectile can be cold extruded. Jobs are limited in size only by the size of the presses available.—**Reported by George W. Baldwin for the Tri-City Chapter.**

Cites Need for Proper Grinding Techniques

Leo P. Tarasov (Center), Norton Co., Spoke on "Metallurgical Aspects of Grinding" in Rochester in November. He is shown with Mort W. Finch (left), of General Motors Corp., and Harry J. Green, Stromberg-Carlson Co.

Speaker: Leo P. Tarasov
Norton Co.

Leo P. Tarasov of the research and development department, Norton Co., discussed "Metallurgical Aspects of Grinding" at the November meeting of the Rochester Chapter.

Dr. Tarasov began his talk by presenting general background information on the grinding process. He pictured grinding as similar to milling with respect to chip formation but not with respect to tool wear since a grinding wheel has to wear at a certain rate to retain its cutting effectiveness. He advanced several general rules of grinding wheel selection with the warning that, because conditions of grinding are so varied, selection should be made only by a specialist.

Detailed metallurgical aspects of grinding were presented by describing the grinding response of a wide variety of toolsteels. The grindability was shown to decrease rapidly when the chromium or vanadium content was increased in nondeforming die steels and high speed steels.

The effect of grinding on the material was next considered. Important points made were: Grinding crack propagation is a direct function of the cracking sensitivity of the material as well as the grinding severity; heat treat cracks are relatively deep and wide and usually follow a random pattern between geometrical features on the object (such as holes, recesses, corners, etc.), whereas grinding cracks are fine and shallow and generally occur at right angles to the direction of grinding; Magnaflux and etching techniques for detecting cracks and etching techniques for showing heat affected areas resulting from improper grinding were described and microstructures comparing improperly ground areas with hardened and tempered structures were shown; retained austenite must be kept low to reduce the sensitivity of the material to crack; and the carbon content of a carburized case should be kept below 0.95%, otherwise a grain boundary network iron carbide structure which is highly sensitive to cracking may result.

Dr. Tarasov concluded by discussing several case histories of grinding cracks. Informal discussion brought out the need for studies to determine the effect of grinding on soft materials and the effect of lubricants or coolants on grinding operations.—**Reported by Sydney Gamlen for the Rochester Chapter.**

Correction

The last line of the caption under the picture on p. 12 of the December issue of Metals Review should read "at a Recent Meeting Held by the British Columbia Chapter" rather than by the Columbia Basin Chapter.

Kansas City Hears Talk On Titanium Development

Speaker: T. W. Lippert
Titanium Alloys Corp.

"New Developments in Titanium" were discussed by T. W. Lippert of the Titanium Alloys Corp. at a meeting of the Kansas City Chapter.

Research on zirconium and hafnium resulted in development of extractive processes for titanium in the 1930's, but attempts to sell the metal were unsuccessful until about 1947. Large-scale production of sponge titanium began in 1950, and production of finished metal is now several tons per day. A goal of 22,500 tons per year by 1956 has been set by military agencies but may be difficult to meet.

Titanium is only a little more than half as dense as steel, yet it is now being made into commercial alloys with yield strengths of 120-130,000 psi. and 20-25% elongation, and the alloys have excellent resistance to corrosion. Even better alloys are known and will be available as soon as higher grade sponge titanium can be obtained in quantity.

The metallurgy of titanium and its alloys is relatively simple. Titanium is quite tolerant of metallic additions, but as little as 0.01% O_2, N_2 or H_2 may drastically alter properties. These gas contaminants are either difficult or impossible to remove. Most of the unusual problems connected with titanium manufacture are experienced up to and including the ingot stage.

Approximately 80% of current titanium output goes into forging and bar stock, but the use of rolled strip and sections for airframes is increasing. It is believed that the present state of know-how will eventually result in a competitive price for titanium.—**Reported by R. D. Scrom, Jr., for the Kansas City Chapter.**

At Chicago's National Officers Night

James B. Austin, A.S.M. President, Spoke to the Chicago Chapter on "Magnification in Time", at the National Officers Night Meeting This Year. Shown in an after-dinner relaxation period are, from left: L. S. Bergan, Pullman Standard Car; M. J. Day, Armour Research Foundation; Dr. Austin; C. W. Bryan, Jr.; Pullman Standard Car; J. A. Kubik, vice-chairman; and Otto Zmeskal, chairman. (Reported by J. A. Erickson for the Chicago Chapter)

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio

Stewart J. Stockett, Technical Abstracter

Assisted by Fred Body, Ardeth Holmes, Mildred Landon and Members of the Translation Group

A General Metallurgical

1-A. Trend Toward Automation in Automatic Weighing and Bulk Materials Handling. I. H. Richardson. *Mechanical Engineering,* v. 75, Nov. 1953, p. 865-870.

Progress made by specific companies in variety of industries toward fully automatic operation. Photographs, diagram. (A5)

2-A. Larger Zinc Supply Predicted for Die Casters at Prices Tending to Fluctuate Less Violently. Simon D. Strauss. *Metals (Daily Metal Reporter Monthly Supplement),* v. 24, Oct. 1953, p. 7, 19.

Reports industry's interest is best served by profitable price for miners and smelters. (A4, Zn)

3-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 20, Oct. 1953, p. 447-454.

From "iron" to "joints". Photographs, diagrams, tables, graphs. (To be continued.) (A10)

4-A. Conservation of Manganese. *Mining Journal,* v. 241, Oct. 16, 1953, p. 440-441.

Précis of various official reports on subject of manganese conservation. Possible methods of economy in use of manganese resources. (A8, B10, Mg)

5-A. Automation Increases Production of Stampings at Oldsmobile. Charles H. Wick. *Machinery,* v. 60, Nov. 1953, p. 202-209.

Mechanisms for automatically loading, unloading and transferring hoods, bumpers and other large stampings have increased productivity and greatly improved safety conditions. Photographs, diagrams. (A5, G3)

6-A. The British Iron and Steel Research Association. *Metallurgia,* v. 48, no. 288, Oct. 1953, p. 178-180.

Research on conservation and recovery of such materials as zinc and sulphuric acid, continuous measurement of strip gage during rolling, inspection of wire dies and improved crane controller layouts. Photographs. (A9, A8, S14, S18, Fe, ST)

7-A. Handling Adaptations in a Press Shop. *Mechanical Handling,* v. 40, Nov. 1953, p. 526-527.

Increased efficiency through adaptations in materials handling equipment. Photographs. (A5, G1)

8-A. A New Method of Handling and Storing Small Components. L. J. Hoefkens. *Mechanical Handling,* v. 40, Nov. 1953, p. 535-542.

Method and control systems. Photographs. (A5)

9-A. Latin-American Steel—Present Position and Future Possibilities. *Metallurgia,* v. 48, no. 288, Oct. 1953, p. 159-164.

Although iron ore, manpower and wage positions are favorable to development of native iron and steel industries, lack of capital and scarcity of coking coal are serious drawbacks. Particulars of ore, coal, electricity and steel positions in seven of these countries. Tables. (A4, ST)

10-A. The British Cast Iron Research Association. J. G. Pearce. *Metallurgia,* v. 48, no. 288, Oct. 1953, p. 175-177.

Elimination of health hazards in foundry, including improved grinding wheel dust extractor unit and other research projects. Diagram, photograph. 9 ref. (A7, E general, CI)

11-A. The British Non-Ferrous Metals Research Association. E. C. Mantle. *Metallurgia,* v. 48, no. 288, Oct. 1953, p. 183-186.

Research on copper, nickel, aluminum, magnesium, lead and tin, and their alloys; zinc and galvanizing; and chemical and electrochemical finishes. Photographs. 26 ref. (A9, L general, Cu, Ni, Al, Mg, Pb, Sn, Zn)

12-A. The Recovery of Zinc From Galvanizers' Dross. M. L. Hughes and R. Humphreys. *Sheet Metal Industries,* v. 30, no. 319, Nov. 1953, p. 955-966, 968.

Sources of dross, amount produced under various conditions and methods employed for recovery of zinc. Tables, micrographs. 20 ref. (A8, Zn)

13-A. Materials Handling at Steelworks Coke Ovens. *Coke and Gas,* v. 15, Nov. 1953, p. 415-420.

Description of handling systems used in blending and in bringing together raw materials of ironmaking process. Photographs. 3 ref. (A5)

14-A. The Electrochemical and Electrometallurgical Industries of Canada. V. G. Bartram. *Electrochemical Society, Journal,* v. 100, Nov. 1953, p. 295c-302c.

Present industrial expansion and future opportunities. Tables, photographs. (A4)

15-A. Current Russian Metallurgical Texts. III. Carl Andrew Zapffe. *Metal Progress,* v. 64, Dec. 1953, p. 88-90.

Presents reviews of five books published in the Soviet Union from 1947 to 1951. "Introduction to Metallurgy", G. I. Pogodin-Alekseev, Y. A. Geller and A. G. Rakhshsadt; "Metals and Alloys in Chemical Machine and Apparatus Construction", D. O. Slavin and E. B. Shteiman; "Corrosion of Chemical Apparatus and Corrosion Resistant Materials", I. Ya. Klinov; "The Metallurgy of Copper and Nickel", V. I. Smirnov; and "Rare Metals", O. A. Songina. (A general)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

16-A. Flow-Through Treatment of Metal Industry Wastes. Frank J. Hendel and V. T. Stewart. *Sewage and Industrial Wastes,* v. 25, Nov. 1953, p. 1323-1330.

Process using automatic equipment for neutralization of acids by lime or soda; reduction of chromium by sulfur dioxide; and oxidation of cyanides by chlorine. Photographs, tables. 7 ref. (A8)

17-A. (Book.) The Aluminum Industry. Stanley V. Malcuit. 36 p. 1953. Bellman Publishing Co., 83 Newbury St., Boston 16, Mass. $1.00.

General discussion of the industry for purpose of assisting individual in choice of a career. Personal qualifications required, scholastic training, salary scale, chances for advancement, advantages and disadvantages, and possibilities for both men and women. (A6, Al)

18-A. (Book.) Engineering Metallurgy. Bradley Stoughton, 4th Rev. Ed. Allison Butts and Ardrey M. Bounds. 479 p. 1953. McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y. $7.50.

Metals as materials of construction; sources of metals; sizing and shaping metallic bodies; welding and joining metallic bodies; metallurgical inspection and testing; theory of alloys; heat treatment of metals and alloys; properties and uses of iron, steel, and nonferrous metals; examples of application of metals in engineering service; corrosion and its prevention; producing and refining iron, steel, and nonferrous metals; furnaces, refractories, and fuels; and measurement of temperature in industrial operations. (A general)

19-A. (Book.) Handbook of Material Trade Names. O. T. Zimmerman and Irvin Lavine. 704 p. 1953. Industrial Research Service, Dover, N. H. $20.00.

An alphabetical list of 15,000 tradenames of commercial materials including metals, plastics, chemicals, and pharmaceuticals. Compositions, properties, and names and addresses of manufacturers or distributors are listed. (A10)

20-A. (Book.) Productivity in the Light Flat-Rolled Segment of the Steel Industry. T. F. Walsh. Fordham University, New York 58, N. Y.

Comprehensive analysis of productivity in the strip mill. Reasons for increased productivity. (A4, A6, F23)

21-A. (Book—German.) **(Iron & Steel Handbook) Werkstoff-Handbuch Stahl und Eisen.** Ed. 3. 748 p. 1953. Verlag Stahleisen m.b.H., Düsseldorf, Germany. DM 78.

General discussion of iron and steel technology. Properties and testing, composition and production of various types, special applications, and treatment and testing methods. (A general, CI, ST)

B

Raw Materials and Ore Preparation

1-B. Factors Controlling the Rate of Sinter Production. E. W. Voice, S. H. Brooks, W. Davies and B. L. Robertson. *Iron and Steel Institute, Journal*, v. 175, Oct. 1953, p. 97-152 + 3 plates.

Equipment, plant layout and operating procedures. Quality of sinters and methods of increasing production. Diagrams, tables, graphs, photographs. 22 ref. (B16)

2-B. Towards Faster Sintering of Ironstone. M. A. K. Grice and W. Davies. *Iron and Steel Institute, Journal*, v. 175, Oct. 1953, p. 155-160 + 1 plate.

Output closely related to airflow may be increased by partial pelletizing of feed in drum mixer. Further benefit may be derived from delaying addition of coke until later stage in mixing. Graphs, table, photographs, diagram. 3 ref. (B16)

3-B. Radiographic Studies of the Process of Sintering Iron Ores. E. Cohen. *Iron and Steel Institute, Journal*, v. 175, Oct. 1953, p. 160-166 + 6 plates.

Minerological nature of sinters and desirable properties. Differences in structure and their relation to sintering process. Tables, photographs. 8 ref. (B16)

4-B. Impact Crushing. L. Ackerman. *Mining Magazine*, v. 89, Oct. 1953, p. 201-212.

Recent crushing tests on Tarkwaian and Witwatersrand quartzites and results. Tables, diagrams. 12 ref. (B13, Au)

5-B. Ilmenite in Egypt. B. W. Holman. *Mining Magazine*, v. 89, Oct. 1953, p. 212-216.

Tests carried out on ore from Wadi-Ranga deposit. Diagram, tables. (B11, Ti)

6-B. (Portuguese.) **Herty Fluidity of Lead Reduction Slags.** Tharcisio D. de Souza Santos. *ABM (Boletim da associacao brasileira de metais)*, v. 9, no. 31, Apr. 1953, p. 261-289.

Experimental investigation on 97 different compositions. Tables, graphs. 7 ref. (B21, Pb)

7-B. The Sullivan Concentrator. *Mine & Quarry Engineering*, v. 19, Nov. 1953, p. 386-395.

Equipment, plant layout and operating procedures. Photographs, diagrams, tables. 1 ref. (B14, Pb, Zn, Fe)

8-B. The Mineralogy of Blast Furnace Sinter. Hobart M. Kraner. *Mining Engineering*, v. 5, Nov. 1953, *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 196, 1953, p. 1114-1117.

Composition of sintered iron ores. Graphs, tables. 28 ref. (B16, Fe)

9-B. Kaiser Mills Nevada Fluorspar. *Mining World*, v. 15, Nov. 1953, p. 38-41.

Equipment, layout and operating procedures of plant for milling and concentrating cryolite. Photographs, table. (B14)

10-B. Tungsten Mining Corporation's Expanded Mill. Howard L. Waldron and Lewis J. Walters. *Mining World*, v. 15, Nov. 1953, p. 42-46.

Facilities and procedures for concentrating tungsten ores. Photographs, graph, flowsheet. (B14, W)

11-B. From Africa Comes Cobalt. *Mining World*, v. 15, Nov. 1953, p. 48-52.

Cobalt mines, mills and methods of concentrating cobalt ores. Photographs, map, graph. (B10, B14, Co)

12-B. Uranium-Mining Operations of the Utex Exploration Co. in the Big Indian District, San Juan County, Utah. Charles A. Steen, George P. Dix, Jr., Scott W. Hazen, Jr., and Russell R. McLellan. *U. S. Bureau of Mines, Information Circular* no. 7669, Oct. 1953, 13 p.

Development and production methods. Tables, maps, photographs. (B general, U)

13-B. (German.) **Ore Beneficiation in Yugoslavia.** Werner Gründer. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 6, no. 10, Oct. 1953, p. 388-394.

Mining and concentration of molybdenum and copper ores. Maps, diagrams, graphs. 4 ref. (To be continued.) (B14, Cu, Mo)

14-B. Ammonia Pressure Leach Process for Recovering Nickel, Copper, and Cobalt From Sherritt Gordon Nickel Sulphide Concentrate. F. A. Forward. *Canadian Mining and Metallurgical Bulletin*, v. 46, no. 499, Nov. 1953, p. 677-684; disc., p. 684; *Canadian Institute of Mining and Metallurgy, Transactions*, v. 61, 1953, p. 363-370.

Details of work carried out in laboratories and pilot plants. Indicates initial costs of development. Predicts savings from adoption of process. Table, diagram, graphs. (B14, Co, Cu, Ni)

15-B. The Rating of Sinter Plants for Economic Output. R. F. Jennings. *Iron and Steel Institute, Journal*, v. 175, Nov. 1953, p. 248-256.

Major problems in designing sintering equipment to give maximum output at minimum costs. Graphs, tables. 6 ref. (B16, Fe)

16-B. Sinter-Plant Assessment Trials at Dagenham and at Cleveland. R. F. Jennings, E. W. Voice, P. K. Gledhill, G. C. Carter and C. F. Ely. *Iron and Steel Institute, Journal*, v. 175, Nov. 1953, p. 267-277.

Equipment, plant layout and operating procedures. Diagrams, tables. (B16, Fe)

17-B. Effect of Mineral Additions and Moisture Control on the Sintering of Sierra Leone Concentrates. P. K. Gledhill, G. C. Carter, and C. F. Ely. *Iron and Steel Institute, Journal*, v. 175, Nov. 1953, p. 277-279.

Addition of lime and lime-bearing materials resulted in a decrease in sintering time and reduction in air requirements, with no appreciable change in permeability. Graphs, table. 4 ref. (B16, Fe)

18-B. Sintering as a Physical Process. H. B. Wendeborn. *Iron and Steel Institute, Journal*, v. 175, Nov. 1953, p. 280-288.

Down-draft sintering process, heat transfer by gas and air during sintering, and reactions and heat transfer in the sinter bed. Heat balance examples. Tables, diagrams. 8 ref. (B16, Fe)

19-B. (English.) **Fundamental Researches on Metallurgical Treatment of Manganese Ores. I. On the Equilibrium in the Reduction of Mn_3O_4 With CO.** Tomimatu Isihara and Akiichi Kigoshi. *Science Reports of the Research Institutes, Tohoku University*, Series A, v. 5, no. 2, Apr. 1953, p. 172-178.

Equilibrium in the reduction, $Mn_3O_4+CO=3MnO+CO$. Diagrams, graphs. 11 ref. (B14, Mn)

20-B. (English.) **Studies on Pyrrhotite. I. Combustibility of Pyrrhotite.** Masuteru Maruyama. *Science Reports of the Research Institutes, Tohoku University*, Series A, v. 5, no. 3, June 1953, p. 208-217.

Roasting reaction rates and the relations between the roasting reactions and the roasting temperatures. Graphs, tables. (B15, Fe)

21-B. (Russian.) **Influences of Gases on the Density of Absorbed Layer of Sodium Oleate During Flotation of Certain Nonsulfide Minerals.** I. N. Plaksin and E. M. Chaplygina. *Doklady Akademii Nauk SSSR*, v. 91, no. 2, July 11, 1953, p. 301-303.

Explains the better floatability of investigated minerals. Graphs. 4 ref. (B14)

C

Nonferrous Extraction and Refining

1-C Investigation of Thickening and Metal Entrapment in a Light Alloy Melting Flux. A. H. Sully, H. K. Hardy and T. J. Heal. *Institute of Metals, Journal*, v. 82, Oct. 1953, p. 49-58 + plate VIII.

Principle of fluxing; upon thickening of flux with continued use, agglomeration of most metal entrapped therein may be effected by stirring. Tables, graphs, diagrams. 18 ref. (C21, B21, Al)

2-C. Copper Refining, Rolling and Drawing. *Metal Industry*, v. 83, Oct. 16, 1953, p. 315-318.

Equipment, plant layout and operating procedures. Photographs. (C general, F23, G4, Cu)

3-C. (French.) **Gadolinium Rich Gadolinium-Magnesium Alloys. Production and Magnetic Properties.** Francoise Gaume-Mahn. *Comptes rendus*, v. 237, no. 14, Oct. 5, 1953, p. 702-704.

Melting techniques. Magnetic properties were determined at temperatures between 78 and 300° K. 6 ref. (C21, P16, Gd, Mg)

4-C. (French.) **Calculation of the Temperature of Thermal Reactions and the Effect of Preheating.** Jean Venturini. *Metaux, Corrosion-Industries*, v. 28, no. 338, Oct. 1953, p. 396-405.

Detailed calculations for the above; corrects temperatures assumed for aluminothermal reductions. Practical results of such a correction in avoiding excessive volatilization and slag losses. Tables, graphs. (C26, Al)

5-C. (Portuguese.) **Production of Lead Refined to 99.99+ Per Cent at the Institute of Technical Research.** Tharcisio D. de Souza Santos. *ABM (Boletim da associacao brasileira de metais)*, v. 9, no. 31, Apr. 1953, p. 235-259.

Details of equipment and procedures. Includes flow chart. 10 ref. (C21, Pb)

6-C. Hurley Furnace and Boiler Description and Design. E. A. Slover. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1435-1441.

Construction details of reverberatory furnace and waste heat boilers

designed for more efficient and flexible operation. Diagrams, tables. (C21, Cu)

7-C. Continuous Casting of Brass. Daniel S. Ogden. *Wire and Wire Products*, v. 28, Nov. 1953, p. 1194-1195, 1246.

Equipment and operating procedures. Photographs. (C5, Cu)

8-C. The Properzi Process for Continuous Casting and Rolling of Aluminum Redraw Rod. Frank R. Nichols. *Wire and Wire Products*, v. 28, Nov. 1953, p. 1185-1187, 1229-1230.

Development of the process in Europe and recent improvements in USA. Photographs. (C5, F23, Al)

9-C. (Polish.) Metallic Calcium Production. M. Orman. *Prace Instytutow Ministerstwa Hutnictwa*, v. 5, no. 3, 1953, p. 129-134.

Methods of production, properties and application. Theoretical analysis of the aluminothermic process. Diagrams, graphs, tables, micrographs. 8 ref. (C26, Al)

10-C. Precipitation of Vanadium From Aqueous Vanadate Solutions by Reduction With Hydrogen. R. N. O'Brien, F. A. Forward, and J. Halpern. *Canadian Mining and Metallurgical Bulletin*, v. 46, no. 499, Nov. 1953, p. 673-676; *Canadian Institute of Mining and Metallurgy, Transactions*, v. 56, 1953, p. 359-362.

Details of process. Effects of catalyst, hydrogen pressure, temperature and solution composition. Graphs, tables. 7 ref. (C2, V)

11-C. Electrical Conductivity and Density of Molten Cryolite With Additives. Junius D. Edwards, Cyril S. Taylor, Lee A. Cosgrove and Allen S. Russell. *Electrochemical Society, Journal*, v. 100, Nov. 1953, p. 508-512.

Experimentally determined electrical conductivities at 1000° C. for cryolite containing 10% by weight NaF, CaF_2, AlF_3 and Al_2O_3. Photograph, graphs, tables. 11 ref. (C23, P15, Al)

12-C. Brand New Plant for Secondary Smelting. William J. Fadden, Jr. *Engineering and Mining Journal*, v. 154, Nov. 1953, p. 72-77.

Equipment, plant layout and operating procedures for smelting aluminum, brass, lead and zinc scrap. Photographs, diagrams. (C21, Al, Zn, Pb, Cu, Zn)

13-C. Ultra-Pure Metals Produced by Zone-Melting Technique. Earle E. Schumacher. *Journal of Metals*, v. 5, Nov. 1953, p. 1428-1429.

New process in which a series of rather narrow molten zones is moved slowly along an ingot of relatively impure material. Each successive zone causes further refining. Diagram, photograph. 3 ref. (C5, Ge)

14-C. Change in Ingot Shape During Zone Melting. W. G. Pfann. *Journal of Metals*, v. 5; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, Nov. 1953, p. 1441-1442.

Tapering of ingot as a molten zone traverses it. Prevention of matter transport by inclining ingot at critical angle. Diagrams. 4 ref. (C5, Ge)

15-C. Analysis of Molten-Zone Refining. Norman W. Lord. *Journal of Metals*, v. 5; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, Nov. 1953, p. 1531-1533.

Process analyzed for long ingots and many zone passages. Formulas are derived which give resultant impurity distribution in terms of finite series. Tables, diagram, graphs. 2 ref. (C5)

D

Ferrous Reduction and Refining

1-D. Experiments on Flame Radiation in an Empty Open-Hearth Furnace. W. P. Cashmore and M. W. Thring. *Iron and Steel Institute, Journal*, v. 175, Oct. 1953, p. 177-182.

Procedures used to determine factors affecting radiation along flame, including steam quality and quantity and fuel temperature. Tables, graphs. 5 ref. (D2)

2-D. (German.) Application of Unalloyed Steels Produced by Various Melting Processes. *VDI-Richtlinien* VDI 12-2028. 1952. 14 p.

Possibilities of substituting special converter steel for openhearth steel. Metallurgical basis, properties of converter steel, effects of finishing processes, fields of application, construction and choice of material. Tables. 29 ref. (D3, D2, CN)

3-D. (Swedish.) On the Possibility of Removing Copper From Steel and Pig Iron. Louis Améen and Claes Pfeiffer. *Jernkontorets Annaler*, v. 137, no. 7, 1953, p. 238-251.

Use of lead, silver, and bismuth to remove copper from molten pig iron or steel. Tables, graphs. (D1, Cu, Cl, Ag, Pb, Bi, ST)

4-D. A Process for the Recovery of Manganese From Open Hearth Slags. I. Development of a Process. II. Technology of the Two Stage Process. H. W. Hosking and J. A. Gregory. *Australasian Engineer*, 1953, Sept., p. 44-55.

The first stage is carried out under acid conditions and produces a high-phosphorus iron. The second reduction uses phosphorus-free slag from first stage and produces a manganese-rich alloy and a slag virtually free of metallic oxides and phosphorus. Graphs, diagram, table. 14 ref. (D2, Mn)

5-D. The Status of Continuous Casting at Allegheny Ludlum. W. B. Pierce. *Blast Furnace and Steel Plant*, v. 41, Nov. 1953, p. 1301-1306.

Pilot plant and operating techniques. (D9, AY)

6-D. A Differential-Pressure Meter for Open Hearths. B. O. Smith. *Instruments*, v. 26, Nov. 1953, p. 1706-1707.

Meter for measurement of openhearth furnace pressure can be installed close to the measuring point on the roof, eliminating errors due to buoyancy effects in connecting pipes. Diagrams. 4 ref. (D2)

7-D. New Skinningrove Blast Furnace. H. G. W. Debenham and W. H. Tubbs. *Iron & Steel*, v. 26, Nov. 1953, p. 507-512.

Structural features, instrumentation and auxiliary equipment. Photographs, diagrams. (D1)

8-D. Arc Furnace Production. W. B. Wallis. *Iron & Steel*, v. 26, Nov. 1953, p. 521-523.

Trends in electric furnace production of steel. Design and development of furnaces, production at specific installations and economic aspects. Photographs. (D5, ST)

9-D. Preparation of Metallic Iron of High Purity. George A. Moore. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1443-1449; disc., p. 1449.

Brief review of present available methods of producing high purity iron. New method is presented consisting of extraction of ferric chloride by ether, reduction of ferric chloride to ferrous chloride, purification of chloride and subsequent electrolytic deposition of metallic iron. Lists properties of iron produced by this method. Table, diagrams. 15 ref. (D8, Fe)

10-D. Manganese as an Indicator of Blast Furnace Slag Oxidation and Desulphurizing Power. Nicholas J. Grant, John W. Dowding and Robert J. Murphy. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1451-1454.

Large number of slag-metal tests which were examined regarding effectiveness of manganese as an indicator. Graphs, tables. 6 ref. (D1, Mn)

11-D. (French.) Study of the Heterogeneity of Forging Ingots. P. Cattier, C. Dubois, J. Bleton and P. Bastien. *Institut de Recherches de la Sidérurgie, Publications*, ser. A, no. 50, Sept. 1953, 261 p.

Comparative study on melting and forging of steel ingots with respect to segregation and localization of inclusions and mechanical properties. Tables, graphs, micrographs. 22 ref. (D9, F22, M28, Q general, AY)

12-D. (Polish.) Reclaiming Melts of High-Speed Steel Waste in an Electric Arc Furnace. K. Radzwicki. *Prace Instytutow Ministerstwa Hutnictwa*, v. 5, no. 3, 1953, p. 113-118.

Reclaiming melting entirely without oxidizing and with partial oxidizing. Advantages of adding high speed steel cinder to the charge. Tables. 7 ref. (D5, TS, Cr, W, V, Ti)

13-D. (Polish.) Slag and Admixture Removal in Basic Open-Hearth Process. III. Sulfur. E. Bucko. *Prace Instytutow Ministerstwa Hutnictwa*, v. 5, no. 3, 1953, p. 143-158.

Slag basicity as the principal factor affecting the ratio of distribution of sulfur between slag and the metal. Graphs, tables. 19 ref. (D2, Fe)

14-D. (Polish.) Slag and Admixture Removal in Basic Open-Hearth Process. Supplement to Part I. Slag. E. Bucko. *Prace Instytutow Ministerstwa Hutnictwa*, v. 5, no. 3, 1953, p. 159-161.

Relationship between FeO, MgO and Al_2O_3 content in slag and between the values characterizing the slag and its basicity. Graphs. (D2, Fe, Mg)

15-D. Development of Open-Hearth Roof Refractories in Great Britain. James Mackenzie. *American Ceramic Society, Bulletin*, v. 32, Nov. 1953, p. 377-384.

Effect of flux content and density of silica brick on performance in furnaces. Silicrete and similar raw materials. Photographs, micrographs, tables. (D2, Fe)

16-D. Review of European Operating and Technical Practices. III. William C. Bell. *Industrial Heating*, v. 20, Nov. 1953, p. 2211-2212, 2214, 2216, 2218, 2220, 2222, 2224.

European steelmaking processes concludes this series of articles. Tables. (D general)

17-D. Steel Mill Refractories and Masonry. II. *Industrial Heating*, v. 20, Nov. 1953, p. 2283, 2284, 2286, 2288.

Methods of openhearth slag and flue dust removal and advantages of monolithic refractories in furnace spouts. (D2)

18-D. Ironmaking From High-Sinter Burdens. G. D. Elliot, J. A. Bond and T. E. Mitchell. *Iron and Steel Institute, Journal*, v. 175, Nov. 1953, p. 241-247.

Recent work using burdens approaching 100% of sinter in the blast furnace. Results obtained discussed in relation to heat balances. Comparisons are made with ore practice. Chart, tables. 9 ref. (D1, Fe)

19-D. The Mechanism of Reduction of Iron Oxides. J. O. Edström. *Iron and Steel Institute, Journal,* v. 175, Nov. 1953, p. 289-303.

Reduction of pure natural hematite and magnetite crystals by hydrogen and carbon monoxide studied with the aid of the microscope. Graphs, diagram, micrographs. 68 ref. (D general, Fe)

20-D. The Ironmaking Plant at John Summers and Sons (Shotton Works). J. F. R. Jones and A. Walker. *Iron and Steel Institute, Journal,* v. 175, Nov. 1953, p. 313-321.

Equipment, plant layout and operating procedures. Diagrams. (D general, Fe)

E
Foundry

1-E. Quantity Production of Malleable Castings. H. Hayden. *Foundry Trade Journal,* v. 95, Oct. 22, 1953, p. 499-503; disc., p. 503-504.

Design, developments and controls, all of which have considerable influence on increasing production and reducing waste. Photographs. (E11, CI)

2-E. The Fluidity of Molten Steel. B. G. Rightmire and H. F. Taylor. *Iron and Steel Institute, Journal,* v. 175, Oct. 1953, p. 167-176.

Quantitative evaluation of fluid flow based on published experimental data and established hydrodynamic theory. Diagrams, tables, graphs. 25 ref. (E23, CI)

3-E. Melting Practice for Investment Casting. II. Sam Tour. *Precision Metal Molding,* v. 11, Nov. 1953, p. 40-41, 83-87.

Melting contamination and losses, refractories and crucibles. Photographs (E15)

4-E. Eight Facts to Consider in Specifying Castings. E. O. Mildebrath. *Precision Metal Molding,* v. 11, Nov. 1953, p. 47, 93-94.

Costs of tooling, rough casting, machining, jigs and fixtures and preparation of surface for finishing. Photographs, table. (E general)

5-E. Mechanization Takes Over Sand Molding. Leon F. Miller. *Steel,* v. 133, Nov. 9, 1953, p. 116.

Automatic molder capable of producing cylinder block halves at rate of 240 per hr. and shallower molds at 300 per hr. Photograph. (E19)

6-E. Flame-Set Spray Resin for Foundries. *Adhesives & Resins,* v. 1, Oct. 1953, p. 231-232.

Solutions of Catalac resin are sprayed on the surface of green sand molds and dried very rapidly to produce a hard finish. Photographs. (E19)

7-E. Oxidized Iron. W. J. Williams. *British Cast Iron Research Association. Journal of Research and Development,* v. 5, Oct. 1953, p. 41-44 + 1 plate.

The oxygen content of a number of taps from each of two melts was deliberately increased and chill test pieces were cast from each tap. No appreciable influence on chilling characteristics that could be attributed to the treatment of the metal and the subsequent changes in oxygen content was detected. Photographs, tables. (E25, CI)

8-E. Gas Analyses of Cast Iron Produced at Various Foundries. B. B. Bach. *British Cast Iron Research Association. Journal of Research and Development,* v. 5, Oct. 1953, p. 45-70 + 1 plate.

Samples of cast iron and pig iron were taken at 12 industrial plants and the oxygen, hydrogen and nitrogen contents determined. Results were tabulated, together with other relevant data such as melting temperature, type of furnace, etc. Tentative conclusions. Photographs, diagrams, tables. (E general, S11, CI)

9-E. Extensions at Millspaugh. *Foundry Trade Journal,* v. 95, Oct. 29, 1953, p. 525-529.

Centrifugal foundry equipment, plant layout and operating procedures. Brief history of the concern. Diagrams, photographs. (E14)

10-E. Shell-Moulding Process. D. N. Buttrey. *Foundry Trade Journal,* v. 95, Oct. 29, 1953, p. 531-536.

Present position of process and techniques available for making shell molds. Tables. 13 ref. (E16)

11-E. Flow Properties of Foundry Sand. J. Gittus. *Iron & Steel,* v. 26, Nov. 1953, p. 501-506.

Various tests for foundry sands and results of these tests for evidence of flowability evaluation. Graphs, photographs, diagrams. 7 ref. (To be concluded.) (E18)

12-E. Composition Control of Steel Castings Improved by New Furnace Sampling Methods. Vincent E. Belusko. *Journal of Metals,* v. 5, Nov. 1953, p. 1430-1432.

New sampling methods permit greater economic and production advantages. Photographs. (E25, S12, CI)

13-E. Moulding Sands for Piston Ring Castings. R. M. Krishman, M. N. Khanna and B. R. Nijhawan. *Journal of Scientific & Industrial Research,* v. 12, sec. A, Sept. 1953, p. 417-421.

Properties of foundry sands from Great Britain were determined and compared with properties of Indian sands. Graphs, micrographs, tables. (E18)

14-E. Casting Torque Converter Parts With Plaster Cores. Charles H. Wick. *Machinery,* v. 60, Nov. 1953, p. 166-171.

Forming of cores; preparation of molds; and pouring, cleaning and testing of castings. Photographs. (E16, Al)

15-E. Shell-Mold Casting of Automotive Parts. James H. Smith. *Machinery,* v. 60, Nov. 1953, p. 186-195.

Equipment and operating procedures at General Motors' foundries. Photographs. (E16)

16-E. Slush Casting of Light Alloys. *Machinery (London),* v. 83, Oct. 30, 1953, p. 872-873.

Equipment and methods. Photographs. (E16, Al, EG-a)

17-E. Investment Precision Casting. A. Dunlop. *Metal Industry,* v. 38, Oct. 30, 1953, p. 355-357.

Process in which accurate molds are produced directly from suitable master patterns. Complications associated with wax molding dies and wax injection equipment are avoided and dimensional errors arising from wax shrinkage and distortion eliminated. Photographs. (To be continued.) (E15)

18-E. Metal Casting Methods. VII. Moulding Sands and Pattern Production. J. B. McIntyre. *Metallurgia,* v. 48, no. 288, Oct. 1953, p. 165-168.

Molding sands and their properties. Sand-cement molding technique; patterns and their production. Photographs. (E18, E17)

19-E. Non-Ferrous Centrifugal Foundry. *Engineer,* v. 196, Nov. 6, 1953, p. 589.

Equipment, plant layout and operating procedures in foundry designed to produce very large castings. Photographs. (E14, EG-a)

20-E. Designing an Iron Foundry. Donald Appleyard and Stephen Rosenberg. *Foundry,* v. 95, Nov. 19, 1953, p. 619-621.

How authors set about this project; results of their deliberations. Diagrams, photograph. (E general)

21-E. Investment Precision Casting. A. Dunlop. *Metal Industry,* v. 83, Nov. 6, 1953, p. 381-382.

Mold making and treatment of castings. Photographs. (E15)

22-E. Centrifugal Casting Solves Non-Magnetic Flywheel Problem. R. J. Severson. *Steel,* v. 133, Nov. 23, 1953, p. 120.

Melt weight of 6300 lb. of aluminum bronze was poured into mold spinning at several hundred rpm. After finish machining, only ounces of metal were removed to meet specifications. (E14, Cu)

23-E. (German.) **Reactions on the Surface of the Mold.** K. Roesch. *Giesserei,* v. 40, no. 22, Oct. 29, 1953, p. 581-585.

Importance of good gas permeability and low liberation of gas. Photographs, table, graphs, micrographs. (E25)

F
Primary Mechanical Working

1-F. Fabricators Install Extrusion Presses for Quick Service. W. G. Patton. *Iron Age,* v. 172, Nov. 5, 1953, p. 165-167.

Equipment and processes resulting in lower material costs and better quality control. Photographs, diagram. (F24, Al)

2-F. Cold "Rocking" Answers Design, Production Problems. K. W. Donle. *Iron Age,* v. 172, Nov. 5, 1953, p. 172-175.

Advantages of cold forging process including wide applications, improved mechanical properties, close dimensional control, superior surface finish and reduction in material requirements. Diagrams, photographs, table. (F22)

3-F. Roll-Design Research as Applied to Rolling-Mill Development. Bernard Robinson and W. A. Lugar *Iron and Steel Institute, Journal,* v. 175, Oct. 1953, p. 183-197.

Numerous points of roll design that should be studied and resolved before schemes for new rolling mills are developed. Tables, diagrams, graphs. 6 ref. (F23)

4-F. Manipulating Equipment, Guides, Guards, and Strippers for Rolling Mills. W. Bailey. *Iron and Steel Institute, Journal,* v. 175, Oct. 1953, p. 198-213.

Representative selection of equipments and their applications with examples taken from some recently installed blooming, slabbing and finishing mills. (F23)

5-F. Maximum Production on Hot Strip Mill. John E. Angle. *Blast Furnace and Steel Plant,* v. 41, Nov. 1953, p. 1289-1294, 1311.

Construction of mill, organization of personnel and scheduling of operations. (F23, CN)

6-F. Rolls and Rolling. XXXVII. Tie Plates. *Blast Furnace and Steel Plant*, v. 41, Nov. 1953, p. 1313-1321.

Detailed instructions for rolling various types of rail tie plates. (F23)

7-F. Five-Step Cold Extrusion Line Forms 60-Mm. Mortar Shells. Ernest Olsen. *Iron Age*, v. 172, Nov. 19, 1953, p. 147-150.

Five cold extrusion presses form a complete line for forming shells without aid of other processing methods. Photographs. 4 ref. (F24, CN)

8-F. CF&I Opens Streamlined Tube Mill at Pueblo, Colo. *Journal of Metals*, v. 5, Nov. 1953, p. 1427.

Equipment, plant layout and operating procedures. Photographs. (F26)

9-F. Planetary Hot Rolling Mill. *Metal Industry*, v. 83, Oct. 1953, p. 339.

Mill, essential feature of which is that work rolls are of small diameter arranged in a planetary system around the circumference of the backup rolls. Photograph. (F23)

10-F. The Rolling of Metals and Alloys. I. Historical Development of the Rolling Mill. Eustace C. Larke. *Sheet Metal Industries*, v. 30, no. 319, Nov. 1953, p. 989-998.

Types and uses of mills dating back to the 19th century. Diagrams, photographs. 10 ref. (To be continued.) (F23)

11-F. Large Pressure Vessel Forgings. A. A. Munro. *Times Review of Industry*, v. 7, new ser., Nov. 1953, p. 28-30, 33.

Composition and properties of the steels used and details of the forging operation. Photographs, tables. (F22, Q general, P general, AY)

12-F. (German.) **Roll Size Effects in Cold Rolling of Metal Sheets and Strips.** A. Geleji. *Acta Technica Academiae Scientiarum Hungaricae*, v. 7, nos. 1-2, 1953, p. 217-223.

Lessening resistance to rolling encountered with smaller diameter work rolls. The flattening of rolls can be calculated with help of the formula of resistance to working and of the Herz formula of flattening of rolls pressed against each other. Diagrams. 5 ref. (F23)

13-F. Symposium on Heavy Presses for Light-Metal Forgings and Extrusions. *ASME, Transactions*, v. 75, Nov. 1953, p. 1481-1533; disc., p. 1534-1542.

Includes "Introduction", J. C. Ward, Jr.; "Requirements for Large Light-Metal Forgings and Extrusions in the Aircraft Industry", C. W. Papen; "Design and Construction of Large Forging and Extrusion Presses for Light Metals", M. D. Stone; "Metallurgy and Production of Suitable Aluminum-Alloy Ingots for Large Forgings and Extrusions", T. L. Fritzlen; "Large-Forging-Press Operations and Production Problems", G. W. Motherwell, J. R. Douslin and A. L. Rustay; and "Large-Extrusion-Press Operations and Production Problems", T. F. McCormick. (F22, F24, EG-a)

14-F. Continuous Production of Improved Gautier Rail Anchors at Mid-West Forging & Manufacturing Co. *Industrial Heating*, v. 20, Nov. 1953, p. 2174, 2176, 2178, 2180, 2330.

Forming and heat treating operations. Photographs, diagrams. (F general, G general, J general, CN)

15-F. Continuous Automatic Processing Line for Beryllium Coils and Rods Placed in Operation. *Industrial Heating*, v. 20, Nov. 1953, p. 2188.

A new design continuous processing line for beryllium coils and rods has just been completed and started into production at the plant of Beryllium Corp. of America, Reading, Pa. Photographs. (F28, F27, Cu)

16-F. Bigger Slabs Answer Strip Demands. *Steel*, v. 133, Nov. 23, 1953, p. 92, 94.

45 x 90-in. universal slabbing mill accommodating ingots up to 20 tons in weight. Photographs. (F23)

17-F. Super-Thin Strip. Rolling It Is Only Half the Job. *Steel*, v. 133, Nov. 16, 1953, p. 132-133.

Operation of a modern mill, including electric drives, air conditioning, hydraulics, electronic gaging and precision grinding. Photographs. (F23)

18-F. High-Speed Welding of Nonferrous Tubing. *Welding Journal*, v. 32, Nov. 1953, p. 1098-1099.

Mills for high-speed conversion of coiled nonferrous strip into welded tubing. Photographs. (F26, EG-a)

19-F. Unique Rolling Mill Has Ingenious Equipment; Rolls Bar Shapes, Strip to Order. Robert T. Reinhardt. *Western Metals*, v. 11, Nov. 1953, p. 66-67.

Equipment, plant layout and operating procedures. Photographs. (F23)

20-F. Fine Tungsten and Molybdenum Wire for Electron Tubes. II. Its Application and Manufacture. C. C. Gee. *Wire Industry*, v. 20, Nov. 1953, p. 1075, 1077-1078, 1080, 1083.

Details of manufacturing and testing procedures involved in mass production of wire. Diagrams, photographs. (F28, T1, W, Mo)

21-F. Stainless Steel Wiredrawing Through Diamond Dies. W. F. G. Kerley. *Wire Industry*, v. 20, Nov. 1953, p. 1095-1096, 1099-1100, 1103, 1106, 1113.

Problems and techniques of the process. General discussion of diamonds; their origin, physical properties and crystallography. Die mounting, repolishing and lubricating. Photographs, diagrams, graph, table. (F28, SS)

22-F. (German.) **Model Experiments Made to Explain Flow Processes in Soaking Pits.** Michael Hansen, Hans Scholz and Oskar J. Stebel. *Archiv für das Eisenhüttenwesen*, v. 24, nos. 9-10, Sept.-Oct., 1953, p. 375-381.

Flow of gases in different furnace pit designs and practical observations. Graph, table, diagrams, photographs. 6 ref. (F21)

23-F. (German.) **Measurements and Controls in Modern Cold-Strip Mills.** Joseph Billigmann. *Stahl und Eisen*, v. 73, no. 22, Oct. 22, 1953, p. 1394-1404.

Present status and importance of measuring and controlling rolling speeds, pressures and thicknesses of strips for increased efficiency. Graphs, tables, diagrams. 47 ref. (F23, S14, S18)

24-F. (German.) **Suitable Drives for Cold-Rolling Spools.** W. Eberhard Baltz. *Stahl und Eisen*, v. 73, no. 22, Oct. 22, 1953, p. 1404-1409.

Problems of automatic accelerating and braking of spools. Diagrams. 5 ref. (F23)

25-F. (German.) **Energy Consumption in Cold Forging on a Double-Thrust Press.** Rudolf Kellermann and Kurt Alsen. *Stahl und Eisen*, v. 73, no. 22, Oct. 22, 1953, p. 1410-1418.

A calorimetric method for measuring pressures of high-speed forging processes. Method is not suitable for measuring pressures required to forge complex shapes. Graphs, photographs, table, diagrams. (F22)

26-F. (German.) **Determining Rolling Pressure and Energy With Nomograms.** Werner Lueg. *Stahl und Eisen*, v. 73, no. 22, Oct. 22, 1953, p. 1426-1428.

Nomograms and their use. Graphs, table. 2 ref. (F23)

27-F. (Polish.) **Determining Approximate Forces and Work During Free Forging.** Jerzy Czarny. *Hutnik*, v. 20, no. 10, Oct. 1953, p. 212-216.

Calculations for determining work of forge hammers. Diagrams, graphs. 7 ref. (F22)

28-F. (Russian.) **Formability of Structural Low-Alloy Steel at High Temperatures.** S. I. Gubkin, V. G. Osipov and A. N. Danil'chenko. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1953, no. 6, June, p. 910-917.

Positive formability determined in range of 20 to 1300° C. Optimal temperature zone for forging and rolling lies in the 900 to 1200° C. range. As the deforming volume increases at 800° C., deformation resistance decreases. Graphs, micrographs. 6 ref. (F22, F23, AY)

G
Secondary Mechanical Working

1-G. Tape-Controlled Machines. Lawrence R. Peaslee. *Electrical Manufacturing*, v. 52, Nov. 1953, p. 102-108.

Any number of machine motions and on-off operations can be programmed through complete cycle from magnetic tape, using record-playback techniques and servo principles. Photographs, diagrams. 11 ref. (G17)

2-G. Machining Integrally Stiffened Structures. J. C. Borger. *Mechanical Engineering*, v. 75, Nov. 1953, p. 871-874

Problems encountered in process, and tremendous advantages of its use, especially as applied to aircraft industry. Diagrams, photographs. (G17)

3-G. Superfinishing Methods for Rotating Shafts. F. Spicer. *Product Finishing*, v. 6, Oct. 1953, p. 48-51.

Principle and advantages of superfinishing. (G19)

4-G. Stretch-Forming. *Aircraft Production*, v. 15, Nov. 1953, p. 440-442.

Equipment suitable for manipulation of section and narrow sheet. Photographs, diagrams, table. (G9)

5-G. Extruding Fastener Holes Simplifies Sheetmetal Assembly. Federico Strasser. *Iron Age*, v. 172, Nov. 19, 1953, p. 151-153.

Extrusion of bosses on sheet stock. Advantages of bosses over flat fastener holes. Diagrams. (G5, K13)

6-G. How Machinable Are the Cast Irons? E. A. Loria. *Iron Age*, v. 172, Nov. 19, 1953, p. 158-161.

Guide to the selection and machining of nodular, malleable and gray cast irons. Table. (G17, CI)

7-G. Feeding Short Strip Stock to Be Formed, Extruded, and Embossed Through a Progressive Die. Paul Prikos. *Machine and Tool Blue Book*, v. 49, Nov. 1953, p. 157-160.

Incorporation of certain designs in the die to obtain smooth operation. Describes dies with automatic coil feed stock arrangements. Diagrams. (G3)

8-G. Plastic Dies Speed Delivery of Experimental Stampings. W. Curtis Miller and W. J. Esdale. *Machinery*, v. 60, Nov. 1953, p. 172-177.

Preparation of dies for production of automobile bodies. Materials, molds, patterns and fitting. Photographs, diagram. (G3)

9-G. Piston Production at Ford Features Automation and Quality Control. Edgar Altholz. *Machinery*, v. 60, Nov. 1953, p. 196-201.

Machining, tin plating, and grading. Photographs. (G17, L17, S12, A5)

10-G. How to Make Plastic Draw Dies in 9 Steps. G. C. Adams. *SAE Journal*, v. 61, Nov. 1953, p. 21-25.

Detailed description of making dies and tooling for production of automobile bodies. Diagrams. (G4, T5)

11-G. The Forming of Aluminium Sheet. II. Bending. H. Hinxman. *Sheet Metal Industries*, v. 30, no. 319, Nov. 1953, p. 943-948, 952.

Tooling and procedures for folding, flanging, curling, grooving, beading and seaming. (To be continued.) (G6, A1)

12-G. Stretcher-Strain Markings in Aluminium Alloys and Methods for Their Elimination. V. A. Phillips. *Sheet Metal Industries*, v. 30, no. 319, Nov. 1953, p. 977-985.

Effects of composition, grain size, heat treatment and working. Graphs, tables. (To be continued.) (G4, A1)

13-G. Pre-Spinning Increases Drop Hammer Production. *Western Machinery and Steel World*, v. 44, Nov. 1953, p. 105-108.

Adapting spinning, as a pre-forming tool, in stage drop hammer operations has reduced costs and increased production. Photographs. (G13, F22)

14-G. (German.) The Kinetics of Grinding Processes. Gustav F. Hüttig. *Zeitschrift für Elektrochemie*, v. 57, no. 7, 1953, p. 534-539; disc., p. 539.

Grinding functions and their applications on coarse and fine grinding processes. Problem of similarity between physical and chemical processes. Graphs, tables. 6 ref. (G18)

15-G. Rubber Pad Forming. *Modern Industrial Press*, v. 15, Nov. 1953, p. 22, 26, 28, 32, 34, 38.

Presses and tooling. Photographs. (G8)

16-G. Electro-Spark Erosion for Metal Machining and Cutting. D. W. Rudorff. *Welding and Metal Fabrication*, v. 21, Nov. 1953, p. 425-429.

Basic principles underlying new method; its advantages. Most important applications lie in field of cemented carbides and highly alloyed heat resistant alloys. Diagrams, photographs. 3 ref. (G17)

17-G. (Book.) Pipe and Tube Bending. Paul B. Schubert. 183 p. 1953. Industrial Press, 148 Lafayette St., New York 13, N. Y. $5.00.

Common methods and operating characteristics of equipment used in bending ferrous and nonferrous pipe and tubing. (G6)

H
Powder Metallurgy

1-H. Tailor-Made Metals and Their Properties. K. R. Beardslee. *Precision Metal Molding*, v. 11, Nov. 1953, p. 34-36, 76.

Techniques of processing, properties and applications of cemented carbides. Photographs, table. (H general, C-n)

2-H. The Sintering Process. II. Furnaces. Philip R. Kalischer. *Precision Metal Molding*, v. 11, Nov. 1953, p. 44-46, 76-80.

Design and use of sintering furnace and importance of time and temperature to the process. Graph, diagrams, table, photographs. (H15)

3-H. The Metal Powder Industry. Robert L. Ziegfeld. *Precision Metal Molding*, v. 11, Nov. 1953, p. 50-52, 93.

Excerpts from paper delivered before American Society of Tool Engineers, Sept. 14, 1953. Growth of the industry and its applications. (H general)

4-H. Metal-Ceramic Interactions. I. Factors Affecting Fabrication and Properties of Cermet Bodies. W. D. Kingery. *American Ceramic Society, Journal*, v. 36, Nov. 1953, p. 362-365.

Includes metal-ceramic reactions, surface and interfacial energies, constituent properties and the effect of the dispersed state on the properties. 22 ref. (H11, Cr, Zr, Ti, Th, Co, C-n)

5-H. Electrodeposition of Copper Powder. H. J. Modi and G. S. Tendolkar. *Journal of Scientific & Industrial Research*, v. 12, sec. A, Sept. 1953, p. 431-438.

Electrodeposition of copper powder from an acid copper sulphate bath and effects of adding glucose, glycerine, glue, gelatin and sodium naphthalene beta-sulphonate. Tables, micrographs. 13 ref. (H10, Cu)

6-H. (Polish.) Sintered Contact Materials. IV. Laboratory Method for Obtaining Electric Contact Materials by Hot Pressing. S. Stolarz. *Prace Instytutow Ministerstwa Hutnictwa*, v. 5, no. 3, 1953, p. 135-142.

Chemical composition of contacts, sintering, current intensity and time and pressing pressures. Diagrams, tables, graphs, micrographs. 7 ref. (H14, W, Cu)

7-H. High Temperature Protection of a Titanium Carbide Cermet. John R. Wilson. *American Ceramic Society, Bulletin*, v. 32, Nov. 1953, p. 375-376.

Coating, containing chromium powder and high silica and baria frit, which protected cobalt-titanium crabide cermet against oxidation at 2200° F. Graphs, diagrams. (H general, Ti, Cr)

8-H. Super Refractories for Use in Jet Engines. Walther L. Havekotte. *Metal Progress*, v. 64, Dec. 1953, p. 67-70.

Manufacture, structure, mechanical properties and high-temperature oxidation resistance of various titanium carbide cermets. Graphs, photographs, tables. (H general, Ti, C-n)

9-H. (English.) On the Mechanical Disintegration of Metal by a Stamp Mill. Tosihiko Okamura, Koji Inagaki and Yoshimichi Masuda. *Science Reports of the Research Institutes, Tohoku University*, Series A, v. 5, no. 1, Feb. 1953, p. 71-80.

Metal powders were prepared and particle sizes and distributions determined. Graphs, diagrams, micrographs. (H10, H11, Cu, CI, CN, Ag)

10-H. (German.) Kinetics of Grinding Processes. O. Theimer. *Kolloid-Zeitschrift*, v. 133, no. 1, Oct. 1953, p. 44-50.

Kinetic theory of powder grinding is extended to higher-order reactions. A procedure to find approximate values of grinding functions is established. Influence of the approximations on numerical values. Graphs. 2 ref. (H10)

A.S.M. MIDWINTER MEETING

Hotel Statler

Boston, Mass.

March 4-5, 1954

J
Heat Treatment

1-J. The Bright Annealing of Copper and Its Alloys. W. C. F. Hessenburg and E. C. Mantle. *Metal Industry*, v. 83, Oct. 16, 1953, p. 323-324; Oct. 30, p. 363-364.

Process, including use of controlled atmospheres. 4 ref. (To be continued.) (J23, Cu)

2-J. (French.) Surface Hardening of Steel by Means of High Frequency Induction Heating. G. Perronne. *Chaleur & Industrie*, v. 34, no. 339, Oct. 1953, p. 279-290.

Theoretical and practical aspects of the method, details of the process and equipment necessary. Results are compared with previous data. Photographs, graphs. 28 ref. (J28, J2, ST)

3-J. 60-Cycle Induction Heating. *Factory Management and Maintenance*, v. 111, Nov. 1953, p. 111-113.

Applications and presents advantages and limitations in heat treating and forging operations on aluminum. (J2, F21, A1)

4-J. Whiteheart Malleable Annealing. *Foundry Trade Journal*, v. 95, Oct. 29, 1953, p. 537-538.

Heat treating process and its advantages. Photograph, table. (J23, CI)

5-J. Strict Gas Control Halts Decarb in Aircraft Tubing. W. D. Latiano. *Iron Age*, v. 172, Nov. 19, 1953, p. 154-157.

Annealing and normalizing operations resulting in practically no surface carbon loss. Photographs, graph, table, micrographs. (J23, J24, CN)

6-J. The Bright Annealing of Copper and Its Alloys. W. C. F. Hessenberg and E. C. Mantle. *Metal Industry*, v. 38, Oct. 30, 1953, p. 363-364.

Recuperative radiant tube and open-flame annealing furnaces. (J23, Cu)

7-J. Flame Hardening With Natural Gas. *Western Machinery and Steel World*, v. 44, Nov. 1953, p.119-120.

Technique. Application is practical when natural gas is mixed in proper proportion with oxygen. Photographs. (J2)

8-J. (German.) The Age-Hardening of Thin Films of Al-Ag Alloys. A. Winkelmann and H. Raether. *Naturwissenschaften*, v. 40, no. 20, 1953, p. 526.

Study of precipitation hardening of vapor-deposited aluminum-silver alloy with electron interferences. Results indicate that thin films reach the stable gamma phase more readily than thicker layers of the alloy because of the absence of internal stresses. Diagram. 6 ref. (J27, Al, Ag)

9-J. Fuel Selection for Heat Treating at Caterpillar. Glen C. Riegel and Thomas Spencer. *Industry and Power*, v. 65, Nov. 1953, p. 72-75.

Factors governing choice of gas or electricity. Photographs. (J general)

10-J. Gas Carburizing—From Pioneer to Practical Production. John T. Mitchell and Russell Buyea. *Industrial Gas*, v. 32, Nov. 1953, p. 3-5, 24.

Method resulting in reduced costs, improved quality of production and better working conditions. Photographs. (J28)

11-J. Production Normalizing of Steel Forgings at Allison Engine Di-

vision. *Industrial Heating*, v. 20, Nov. 1953, p. 2164-2166, 2168, 2170.

Includes photographs. (J24)

12-J. An Evaluation of the Hardening Power of Quenching Media for Steel. II. Earl J. Eckel, Ross M. Mayfield, Glen W. Wensch and Frank A. Rough. *Industrial Heating*, v. 20, Nov. 1953, p. 2192, 2194, 2196, 2198, 2200, 2202, 2204, 2206.

Jominy end-quench hardenability test and results of water, brine, oil and air quenches. Graphs, tables, diagrams, photograph. (To be continued.) (J26, J2)

13-J. Selective Flame Hardening Improves Camshaft Wear Resistance. W. G. Patton. *Iron Age*, v. 172, Nov. 12, 1953, p. 171-174.

Automatic unit and its advantages of versatility, safety, high production and close control. Photographs. (J2)

14-J. The Bright Annealing of Copper and Its Alloys. W. C. F. Hessenberg and E. C. Mantle. *Metal Industry*, v. 83, Nov. 6, 1953, p. 377-380.

Construction of annealing furnaces and effects of atmosphere composition and residual rolling lubricants on surface finish. Photographs, diagrams. 19 ref. (J23, Cu)

15-J. Measurement of Case Depth. Dale J. Wright. *Metal Progress*, v. 64, Dec. 1953, p. 86-88.

Equipment and procedures for a rapid, reliable, low-cost test. Standard specimens are used with direct reading microscope. Photographs. (J28, CN)

16-J. Controlled Atmospheres. Their Generation and Utilization. O. E. Cullen. *Metal Progress*, v. 64, Dec. 1953, p. 101-106.

Composition and uses of atmospheres for various heat treating operations. (J2, ST)

17-J. (Czechoslovakian.) Heat Treatment as a Characteristic Factor of Carbon and Alloyed Structural Steels. *Hutnické Listy*, v. 8, no. 10, Oct. 1953, p. 521-528.

Favorable effects of fast cooling on mechanical properties, aging resistance and weldability. Graphs, table. 8 ref. (J26, J27, CN, AY)

18-J. (Czechoslovakian.) Methods of Study and Control of Heat Treatment of Steel. Ladislav Jenicek and Bohdan Sestak. *Hutnické Listy*, v. 8, no. 10, Oct. 1953, p. 512-521.

Magnetic measurements. Methods for determining the beginning of martensite transformation. Diagrams, graphs. 25 ref.
(J general, N8, ST)

19-J. (Book.) Hardenability of Cast Steel. Naval Research Laboratory. 37 p. Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25. Photostat $5.00.

Tests indicate that within the usual limits of accuracy, hardenability factors established for forged steel apply to cast steel if allowance is made for presence of carbide formers. (J26, CI)

20-J. (Book—German.) (A Collection of Articles on Hardening Technology) Härterei-technische Mittellungen. P. Riebensahm, editor, v. 5, 283 p. 1952. Carl Hanser Verlag, Munich 27, Germany. DM.24.00.

Twelve previously unpublished papers deal with wide range of topics relative to steel heat treating and various surface hardening processes. (J26, J28)

K Joining

1-K. Bimetallic Water Heaters Brazed for Strong, Tight Joints. Albert H. Trageser. *Iron Age*, v. 172, Nov. 5, 1953, p. 176-177.

Copper for corrosion resistance and steel for strength have been combined to produce hot-water heaters at moderate cost, yet with excellent serviceability. Diagram, photographs. (K8, T27, Cu, CN)

2-K. Better Tank Construction Methods Increase Lining Life. Manson Glover. *Iron Age*, v. 172, Nov. 5, 1953, p. 178-182.

Techniques to be observed to insure close, permanent bond between rubber or plastic lining and shell. Photographs, diagrams, table. (K11)

3-K. Sheet Metal Welded Joints. Fred Rogers. *Modern Machine Shop*, v. 26, Nov. 1953, p. 182-184, 186, 188.

How machine designer can make it difficult or simple for welder as to type of welded joint specified. Diagrams. (K general, CN)

4-K. Properties of Preloaded Steel Bolts. W. C. Stewart. *Product Engineering*, v. 24, Nov. 1953, p. 191-195.

Effects of applied torque, relaxation, preloading and repeated impact loads. Diagrams, tables, graphs. 12 ref. (K13, Q6, CN)

5-K. Black-Up Flux: New Aid to Welding. Alvin L. Bennett. *Welding Engineer*, v. 38, Nov. 1953, p. 38-40.

Problems, functions, techniques and applications of fluxing. Photographs, diagrams. (K1, AY, SS)

6-K. How to Weld 430 Stainless. Lester F. Spencer. *Welding Engineer*, v. 38, Nov. 1953, p. 42-46, 48.

Reports that ferritic stainless steels are acceptable substitutes in many instances for nickel-bearing austenitic stainless steels. Corrosion and heat resistance, preheating and annealing and welding techniques. Photographs, tables. 8 ref.
(K general, SS)

7-K. Adhesive Joints. *Aircraft Production*, v. 15, Nov. 1953, p. 402-406.

Tests and structural applications of Redux-bonding process. Diagrams, photographs, graphs. (K12)

8-K. Sheet-Metal Welding. II. Resistance-Welding in the Fabrication of Gas-Turbine Assemblies. *Aircraft Production*, v. 15, Nov. 1953, p. 420-429.

Resistance welding equipment and techniques adapted in use of mechanical fixtures. Table, diagrams, photographs. (K3)

9-K. Universal Welder Reduces Welding Costs. *American Machinist*, v. 97, Nov. 9, 1953, p. 126-128.

Unit in which fixtures are eliminated by radial-arm head mounting arrangement, making submerged-melt welding practicable on low-activity assemblies. Photographs, diagrams. (K1)

10-K. Welded Tubular Steel Factory Structure. *Engineer*, v. 196, Oct. 30, 1953, p. 570-572.

Structural frame of factory which consists of a completely welded assembly of tubular steel columns and trusses. Photographs, diagrams.
(K general, CN)

11-K. Automatic Welding Cuts Costs of Fan and Blower Elements. *Machine and Tool Blue Book*, v. 49, Nov. 1953, p. 185-186, 188, 190, 192.

Equipment, application and advantages. Photographs. (K1)

12-K. Mechanical Fastening of Magnesium Assemblies. *Magnesium*, 1953, Nov., p. 1-6.

Procedures for assembly of parts by riveting, bolts and nuts, inserts, pins, dowels, keys and other fasteners. Photographs. (L13, Mg)

13-K. How to Control Carbide Precipitation in Welding Stainless Steels. G. E. Linnert and R. M. Larrimore, Jr. *Materials & Methods*, v. 38, Nov. 1953, p. 98-103.

Post annealing, use of special grades of steel, and proper welding technique are recommended as most satisfactory methods.
(K general, J23, SS)

14-K. The British Welding Research Association. K. Winterton. *Metallurgia*, v. 48, no. 288, Oct. 1953, p. 187-191.

Report of progress in welding field and suggested projects for future work. Photographs. (K general, A9)

15-K. An Unusual Application of Aluminium Flame Brazing. F. J. M. Smith. *Sheet Metal Industries*, v. 30, no. 319, Nov. 1953, p. 935-942.

Brazing of small-gage sheet. Diagrams, photographs. (K8, Al)

16-K. Welding Ultra-Thin Materials. *Sheet Metal Industries*, v. 30, no. 319, Nov. 1953, p. 967-968.

Gas-shielded arc welding of foils, using helium on the under side and argon on the top surface. Photographs. (K1, SS, T1)

17-K. Design of Transformers for Resistance Welding Machines. D. L. Knight. *Electrical Engineering*, v. 72, Dec. 1953, p. 1088-1093.

Transformer design for resistance welding machines on basis of ratings, construction, impedance, efficiency, excitation and core loss, types of secondaries and insulating materials. Diagrams, photographs, graphs. 4 ref. (K3)

18-K. Point Shapes for Large Aluminium Rivets. D. A. Barlow and A. W. Brace. *Engineering*, v. 176, Oct. 23, 1953, p. 513-516.

Tests to determine optimum design in rivet-point shapes. Graph, photographs, tables, diagrams. 6 ref. (K13, Al)

19-K. Structural Failures in Welded Ships. *Industry & Welding*, v. 26, Dec. 1953, p. 39-42, 45.

Three basic factors (material, design and fabrication) involved in prevention of failures in welded structures. Photographs.
(K general)

20-K. Plug-In Sequence Timing Panel Reduces Spotwelding Maintenance Time. *Industry & Welding*, v. 26, Dec. 1953, p. 47-48, 78-79.

Designated a sequence-timing panel, this electronic device tells the spotwelder what to do and when to do it. Photographs. (K3)

21-K. Rapid Transit Track Maintenance Cut 30 Percent by Thermit Welding. Charles Berka. *Industry & Welding*, v. 26, Dec. 1953, p. 50-52, 54.

Includes photographs. (K4)

22-K. Silver Brazed Cutting Tools Withstand Shock and Vibration. *Industry & Welding*, v. 26, Dec. 1953, p. 66-68, 70, 72-73.

Induction brazing has many advantages when volume warrants the extra equipment. Diagrams, photograph. (K8, Q6, Q9)

23-K. Use Inert Arc Welding for Smooth, Even Joints. *Industry & Welding*, v. 26, Dec. 1953, p. 74-76, 78.

Another example of how a fabricator—by studying the specialized needs of an industry—can select a particular welding process and adapt

it to build a product that fits those needs exactly. Photographs. (K1)

24-K. The Electric Resistance Welding Process for Making Steel Tubes. J. S. Blair. *Institute of Welding, Transactions,* v. 16, Oct. 1953, p. 117-126.

Earlier methods and new process including equipment, plant layout and operating procedures. Diagram, photographs. (K3)

25-K. Shrink Fits. Holding Power Can Be Increased. Bernard Trock. *Iron Age,* v. 172, Nov. 12, 1953, p. 175-177.

Surface finish, radial pressures and time have been found to be important factors in the holding power of shrink fits. Tables, graph, diagrams. (K13)

26-K. Some Practical Pointers on Silver Alloy Brazing. Sam McCaulley. *Metal Progress,* v. 64, Dec. 1953, p. 161-162, 164.

Techniques for making satisfactory and economical joints. Advantages and properties of typical joints. (K8, Ag)

27-K. Finishes for Soft Soldering Refractory Materials. E. E. Halls. *Product Finishing,* v. 6, Nov. 1953, p. 68-73, 108, 110.

Methods for producing suitable electroplate finishes for soldering on components of refractory materials. Tables. (K7)

28-K. Over 6,000 Cylinder Heads Reclaimed by Welding. *Railway Locomotives and Cars,* v. 127, Dec. 1953, p. 52-57, 60-61.

Abstract of a committee report of the Master Boiler Makers' Association, Sept. 15, 1953, at the Associations' annual meeting at Chicago. Photographs. (K general, A1)

29-K. Pick the Right Arc Welding Method. Thomas H. Hruby. *Steel,* v. 133, Nov. 23, 1953, p. 84-87.

Compares welding by coated electrode, submerged arc, or inert-gas shielded arc methods. Photographs, table. (K1)

30-K. Printed-Wiring Multiple Soldering Methods. Alvin E. Stones. *Tele-Tech,* v. 12, Dec. 1953, p. 62-64, 160, 163.

Modified double-pot and single-pot processes which provide low circuit board reject rate. Selection of materials and prevention of warpage, blistering and bridging. Photographs, table. (K7)

31-K. Argon-Arc Welding of Copper and Copper Alloys. Edwin Davis and E. A. Taylor. *Welding and Metal Fabrication,* v. 21, Nov. 1953, p. 418-423.

Results of welding trials. Photographs, tables. 4 ref. (K1, Cu)

32-K. Gas or Arc Welding for Cast Iron? T. J. Palmer. *Welding and Metal Fabrication,* v. 21, Nov. 1953, p. 436-439.

Preparation of casting, effect of heat on cast iron, preheating and other factors to be considered in welding cast iron. Photographs, table. (To be continued.) (K1, K2, CI)

33-K. Spot Welding of Titanium-Carbon Alloys. E. F. Holt, F. H. Vandenburgh and N. L. McClymonds. *Welding Journal,* v. 32, Nov. 1953, p. 1057-1066.

Investigation on spot welding of titanium-carbon alloys containing 0.1, 0.4 and 0.6% carbon in sheet thicknesses of 0.038-0.047 in. Surface preparation, physical properties and welding conditions. Photographs, tables. (K3, Ti)

34-K. The Human Element in Welding. Richard C. Wiley. *Welding Journal,* v. 32, Nov. 1953, p. 1066-1070.

Present shortage of welding engineers. Suggests corrective measures including expanding public relations, using engineering personnel to more advantage making in-service plant training count, and calling upon education to a greater extent. Photographs, diagrams. (K general, A3, A6)

35-K. The Brazing of Titanium. N. A. DeCecco and John M. Parks. *Welding Journal,* v. 32, Nov. 1953, p. 1071-1081.

Methods of making brazed joints, development of fluxes and preliminary investigations on recrystallization welding. Diagrams, micrographs, tables. 9 ref. (K8, Ti)

36-K. Some Recent Advances in the Welding of Molybdenum. W. H. Kearns, H. B. Goodwin, E. Eichen and D. C. Martin. *Welding Journal,* v. 32, Nov. 1953, p. 1082-1088.

To secure ductile welds, it is necessary that the faying surfaces of specially purified molybdenum be cleaned carefully and the welding be done in high vacuum. Tables, micrographs, photographs. 20 ref. (K general, Mo)

37-K. Welding for Low-Temperature Service. Robert W. Bennett. *Welding Journal,* v. 32, Nov. 1953, p. 1089-1097, 1099-1101.

Properties of various weld metals and base materials used in the fabrication of pressure vessels and heat exchangers for low-temperature service; tests used for their evaluation. Tables, graphs, micrographs. (K general, Q general, CN, AY, EG-a)

38-K. ABC's of Pipe Cutting and Welding. D. A. Spaulding. *Welding Journal,* v. 32, Nov. 1953, p. 1100-1101.

Procedures in oxy-acetylene cutting and welding. Photographs. (K2, G22)

39-K. The Self-Adjusting Arc—Improved Power Sources. J. C. Needham, W. G. Hull and L. H. Orton. *Welding Research,* v. 7, Oct. 1953, p. 100r-102r.

Mechanism of arc-length control in the self-adjusting arc, particularly the effect of output characteristics of the power source on degree of self-adjustment of arc lengths. Diagrams, graphs. 1 ref. (K1)

40-K. Vanadium-Bearing High Tensile Weldable Steels. *Welding Research,* v. 7, Oct. 1953, p. 103r-107r.

Report of research work on possible replacement of molybdenum by vanadium for high-tensile steels. Tables, photographs. 2 ref. (K9, P general, Q general, AY)

41-K. Weldability of Twelve Low-Alloy Steels Containing Vanadium. B. J. Bradstreet. *Welding Research,* v. 7, Oct. 1953, p. 107r-110r.

Experimental studies to determine susceptibility to hard-zone cracking. Tables, diagram, photograph. 3 ref. (K9, AY)

42-K. Triple-Projection Welding of Deep Drawing Mild-Steel Sheet. J. E. Roberts. *Welding Research,* v. 7, Oct. 1953, p. 111r-114r.

Experimental studies including description of welding machine, materials, specimen type and testing methods. Tables, diagrams, graph. 2 ref. (K3, CN)

43-K. Welded Fabrication Method Gives Time, Weight Savings on Giant Gear. Everett W. Sturdy. *Western Metals,* v. 11, Nov. 1953, p. 59-60.

Equipment and technique. Saving in time and cost. Photographs. (K general)

44-K. (Book.) **The Inert-Gas-Shielded Metal Arc Welding Process.** W. H. Woodling. American Welding Society, 39 West 39th Street, New York 18, N. Y. $1.00.

Development of the process, equipment required, and necessary controls and their function. Operation instructions and safety precautions are also presented. (K1)

L Cleaning, Coating and Finishing

1-L. Radiant Burners Improve Galvanizing Quality, Cut Costs. R. M. Breckenridge and K. E. Rasmussen. *Iron Age,* v. 172, Nov. 5, 1953, p. 168-171.

Design and applications of novel burner which lengthens life of galvanizing pots and cuts operating costs. Diagrams, graphs, photographs. (L16)

2-L. A Bibliography of Publications on Industrial Protective Coatings. *Organic Finishings,* v. 14, Oct. 1953, p. 11-13, 16, 18-25.

An annotated list of material published in the U. S. since 1940 and currently in print. Divided into 24 sections. (L general)

3-L. Cleaning and Preparation of Metals for Electroplating. VII. Final Summary on Degreasing Evaluation Tests. Henry B. Linford and E. B. Saubestre. *Plating,* v. 40, Nov. 1953, p. 1269-1271.

New "atomizer test" for evaluating cleaners. Sensitivity of degreasing evaluation tests. Tables. 18 ref. (L12)

4-L. Applications of Barrel Enameling. W. S. Field. *Product Finishing,* v. 6, Oct. 1953, p. 52-55.

Field of application and costs. Photographs. (L27)

5-L. Finishes for Soft Soldering. Clean Finishes. E. E. Halls. *Product Finishing,* v. 6, Oct. 1953, p. 66-76, 120.

Requirements and production methods. Tables. (L general, K7)

6-L. Recent Developments in Protective Coatings. Bright Plating Protection. *Product Finishing,* v. 6, Oct. 1953, p. 77-78.

Removal of rinse water and prevention of finger prints and discoloration. (L12)

7-L. Selection of Metal Cleaning Cycles. I. Samuel Spring. *Steel,* v. 133, Nov. 9, 1953, p. 112-114.

Final decision depends upon type of metal, soil, level of agitation, performance standards, water supply and cleaner. Tables, photographs. (To be continued.) (L10, L12, L13)

8-L. (German.) **Surface Layers of High Melting Titanium Compounds.** A. Münster and W. Ruppert. *Zeitschrift für Elektrochemie,* v. 57, no. 7, 1953, p. 564-571.

Methods of applying films of titanium nitride and titanium carbide on iron. Reaction mechanisms and macroscopic properties and microscopic structures of these films. Micrographs, graph. 13 ref. (L25, Ti, Fe)

9-L. Temperature Cycles of Enamelled Castings During the Process of Enamel Fusing. E. R. Evans. *British Cast Iron Research Association. Journal of Research and Development,* v. 5, Oct. 1953, p. 78-92 + 1 plate.

Temperature cycles determined by means of a thermocouple attached to a test casting in the furnace. Diagrams, graphs, photographs, tables. (L27, CI)

10-L. Magnesium to the Fore. *Chemical and Engineering News,* v. 31, Nov. 16, 1953, p. 4778, 4781.

Chemical surface treatments of magnesium for resisting corrosion and abrasion. Experiments using magnesium powder as fuel in internal combustion engines. (L14, T25, Mg)

NEW PROTECTIVE COATING CHEMICAL FOR ALUMINUM

ALODIZING

Alodizing with "Alodine,"* a new technique in the protective coating of aluminum, was made available for production-scale use in 1946. Since that time Alodizing has largely supplanted the more elaborate, costly and time-consuming anodic treatments in the aircraft and other industries.

Continuous and successful industrial use has clearly demonstrated the simplicity and economy of the Alodizing process as well as the effectiveness of the "Alodine" amorphous coatings, particularly as a base for paint. In fact, the paint-bond that Alodized aluminum provides has been found to be superior to that possible with chromic acid anodizing.

The corrosion-resistance of unpainted aluminum Alodized with "Alodine" Nos. 100 or 300 is excellent, easily meeting the requirements of Specification MIL-C-5541. However, a need for protection of unpainted aluminum, even better than that obtained with chromic acid anodizing, has long been recognized.

NEW IMPROVED "ALODINE" DEVELOPED By ACP RESEARCH CHEMISTS

Several years of intensive research have now led to a new type of "Alodine," designated as "Alodine" No. 1200. This new protective coating chemical forms an amorphous mixed metallic oxide coating of low dielectric resistance that provides unusually high corrosion-resistance for unpainted aluminum. In addition, it forms an excellent paint bond that approaches closely the high quality obtained with the earlier types of "Alodine."

After having been tested for conformance with Specification MIL-C-5541, "Alodine" No. 1200 is now about to go into production.

PROCESS DETAILS

"Alodine" No. 1200 is the only essential chemical needed to prepare the coating bath and the final rinse bath. One of its unique features is that it can be used in tanks in an immersion process, or, in a multi-stage power washer in a spray process, or, with a slight adjustment of pH, with brush or portable spray equipment in a manual process. This means that even where the simple production equipment is not available, or where touching up of damaged coatings previously Alodized or anodized is required, excellent protection and paint bonding can still be obtained with practically no equipment.

All three methods of application easily meet the requirements of Specification MIL-C-5541.

Process sequence for all three methods of application is the same as for other standard grades of "Alodine" such as Nos. 100, 300, and 600, viz.: 1. Pre-cleaning. 2. Rinsing. 3. Alodizing. 4. Rinsing. 5. Acidulated rinsing. 6. Drying.

Coating time in an immersion process ranges from 2 to 8 minutes and in a mechanized spray process is about 30 seconds. "Alodine" No. 1200 baths are operated at room temperatures (70° to 100°F.) and heating is required only if the bath has gotten cold after a "down" period.

RECOMMENDED USES FOR "ALODINE" No. 1200

"Alodine" No. 1200 is specifically recommended for coating wrought products that are not to be painted or are to be only partially painted; and for coating casting and forging alloys whether or not these are to be painted. "Alodine" Nos. 100 and 300 are still recommended for coating wrought products such as venetian blind slats, awnings, etc., that are invariably painted.

RESULTS OF TENSILE TESTS

This new "Alodine" not only retards visible corrosion and pitting, but as shown in the table below, the loss of ductility with "Alodine" No. 1200 both brush and dip after 1000 hours salt spray was less than for chromic acid anodizing after 250 hours, and for "Alodine" No. 100 and a conventional chromate treatment after 168 hours exposure.

PROCESS	SALT SPRAY EXPOSURE	COMPLIANCE WITH TENSILE REQUIREMENTS OF MIL-C-5541
CHROMIC ACID ANODIZING	168 hrs.	passes
	250 hrs.	passes
	500 hrs.	fails
	1000 hrs.	fails
BRUSH "ALODINE" No. 1200	168 hrs.	passes
	250 hrs.	passes
	500 hrs.	passes
	1000 hrs.	passes
DIP "ALODINE" No. 1200	168 hrs.	passes
	250 hrs.	passes
	500 hrs.	passes
	1000 hrs.	passes
DIP "ALODINE" No. 100	168 hrs.	passes
	250 hrs.	fails
	500 hrs.	fails
	1000 hrs.	fails
CONVENTIONAL CHROMATE TREATMENT	168 hrs.	passes
	250 hrs.	fails
	500 hrs.	fails
	1000 hrs.	fails

*"Alodine" Trade Mark Reg. U. S. Pat. Off.

CHEMICALS ACP PROCESSES

AMERICAN CHEMICAL PAINT COMPANY

General Offices: Ambler, Penna.

Detroit, Michigan **Niles, California** **Windsor, Ontario**

11-L. Enamelling of Cast Iron. V. Montoro, E. Lossa, A. Guissani and E. Guissani. *Foundry Trade Journal*, v. 95, Nov. 5, 1953, p. 579-581.

Causes of enamel defects including slag and other inclusions, blow holes, rust, and gas evolution. (L27, CI)

12-L. Studies on the Electrodeposition of Brass From Non-Cyanide Bath. I. S. K. Ray and T. Banerjee. *Journal of Scientific & Industrial Research*, v. 12, sec. A, Sept. 1953, p. 438-443.

Electrodeposition of brass from bath containing cupric tartrate and sodium zincate. Graphs, tables. 18 ref. (L17, Cu)

13-L. Flame-Plating Protects Parts From Wear. *Machine and Tool Blue Book*, v. 49, Nov. 1953, p. 209-210, 212-214.

Method of applying thin metallic coatings on metal parts and its applications. Photographs, diagrams, graph. (L23)

14-L. Barrel Finishing Processes for Small and Large Die Castings. T. P. Barbicane. *Machinery (London)*, v. 83, Oct. 30, 1953, p. 866-871.

Reviews tumbling operations, media for burnishing, methods of holding large components and local protection from abrasion. Photograph, diagrams. (L10, E13)

15-L. Properties of HAE Finish for Magnesium. R. G. Gillespie. *Materials & Methods*, v. 38, Nov. 1953, p. 104-105.

Electrolytically applied ceramic coating which has excellent corrosion, abrasion and heat resistance. Photographs. (L27, Mg)

16-L. Selecting Metal Cleaning Methods. *Materials & Methods*, v. 38, Nov. 1953, p. 119-134.

Basic features of the standard metal cleaning methods to aid in selecting method most feasible for a particular application. Tables. (L10, L12)

17-L. Chromium Plating Die-Cast Aluminum Engine Cylinders. Fred M. Burt. *Metal Finishing*, v. 51, Nov. 1953, p. 65-69.

Equipment, plant layout and operating procedures. Photographs, diagram. (L17, Al, Cr)

18-L. Growth of Parallel Grooves on Soluble Anodes by Electrolysis. Toshio B. Horiuchi. *Metal Finishing*, v. 51, Nov. 1953, p. 70-74.

Concludes that grooves are formed by bubbles which form at the lower part of the anode and ascend along the anode surface. Photographs, diagrams. (L17, Cu, Fe)

19-L. Electrodeposition of Copper From the Monoethanolamine Bath. T. L. Rama Char and N. B. Shivaraman. *Metal Finishing*, v. 51, Nov. 1953, p. 75-78.

Plating bath and experimental results. 17 ref. (L17, Cu)

20-L. Barrel Finishing of Metal Products. H. Leroy Beaver. *Products Finishing*, v. 18, Nov. 1953, p. 46-48, 50, 52, 54, 56.

Selection of a mineral for reducing surface area. Photograph. (L10, ST)

21-L. Burr Removal Expedited by Wet Tumbling. Harry C. Larson. *Products Finishing*, v. 18, Nov. 1953, p. 66-69.

Fast operation which meets requirements on a large variety of parts. Photographs. (L10)

22-L. Porcelain Enameling Steel Pipe. *Products Finishing*, v. 18, Nov. 1953, p. 69-70, 74.

Operation of dipping and drying machine. Photographs (L27, ST)

23-L. Protective Ceramic Coatings Versus the Corrosive Effects of Exhaust-Gas. Michael Lorant. *Refractories Journal*, v. 29, Oct. 1953, p. 418-420.

Tests of ceramic coatings on heat resistant alloys. Specimens were exposed to lead bromide vapors at temperatures of 1350 to 1650°F. (L27, SG-h)

24-L. (German.) The Application of Polarographic Adsorption Analysis to the Investigation of Electrolytic Bright Baths. J. Smelik. *Metalloberfläche*, Ausgabe B, v. 5, no. 11, Nov. 1953, p. 165-169.

Quantitative control of organic additions to bright baths. Theoretical basis and practical process are indicated. Tables, graphs. 8 ref. (L17)

25-L. (Polish.) Electrolytic Polishing of Steel at Elevated Temperatures. Z. Wojcik. *Prace Instytutow Ministerstwa Hutnictwa*, v. 5, no. 3, 1953, p. 123-128.

Principles for the preparation of suitable electrolytes and technique. Graph, diagram, micrographs. 12 ref. (L13, ST)

26-L. (Russian.) Study of Electrocrystallization of Metals in an Ultrasonic Field. S. M. Kochergin and N. N. Terpilovskii. *Zhurnal Fizicheskoi Khimii*, v. 27, no. 3, Mar. 1953, p. 394-398.

Mechanism of the effect of ultrasonic vibrations on electrodeposition was studied. Diagrams, graphs. 4 ref. (L17, Ni, Co, Sn, Cr)

27-L. Corrosion and Plant Maintenance. Joe Rench. *American Oil Chemists' Society, Journal*, v. 30, Nov. 1953, p. 571-574.

Components of paint and characteristics of each ingredient justifying its use. Application of paint in combating corrosion. (L26)

28-L. Some Properties of Tin-II Sulfate Solutions and Their Role in Electrodeposition of Tin. II. Solutions With Tin-II Sulfate and Sulfuric Acid Present. Clarence A. Discher. *Electrochemical Society, Journal*, v. 100, Nov. 1953, p. 480-484.

Measurement of density, refractive index, surface tension, viscosity, freezing point depression, conductivity, transference number and electrode potential to pure tin and hydrogen. Relationships between concentration and the magnitude of these properties. Tables, graphs. 4 ref. (L17, SN)

29-L. Electroplating on Titanium. William H. Colner, Morris Feinleib and John N. Reding. *Electrochemical Society, Journal*, v. 100, Nov. 1953, p. 485-489.

Method for obtaining adherent electrodeposits which includes subjecting the titanium to anodic etch prior to plating. Graph, photographs. (L17, Ti)

30-L. An X-Ray Study of the Effect of Organic Compounds on the Crystal Growth of Nickel During Electrodeposition. Francis Denise and Henry Leidheiser, Jr. *Electrochemical Society, Journal*, v. 100, Nov. 1953, p. 490-495.

Effect on grain size and orientation. Reports that orientation other than (100) produced brittle deposits. Photographs, tables and graph. 7 ref. (L17, M26, Ni)

31-L. Correlation of Limiting Currents Under Free Convection Conditions. C. R. Wilke, M. Eisenberg and C. W. Tobias. *Electrochemical Society, Journal*, v. 100, Nov. 1953, p. 513-523.

Experimental studies of limiting rates of deposition of copper ions at a vertical cathode in an unstirred solution. Diagram, photographs, tables, graphs. 23 ref. (L17, Cu)

32-L. Theory and Practice of Chemical Polishing. II. Processes for Light Alloys, Iron Group and Other Metals. R. Pinner. *Electroplating and Metal Finishing*, v. 6, Nov. 1953, p. 401-410.

The applications of chemical polishing to metallography and in machining. Typical polishing costs. Tables, graphs. 41 ref. (L13, M21, G17, EG-a, ST, Zn, Cd)

33-L. Some Observations on the Electrodeposition of Tin-Zinc Alloys. Bernard C. Lewsey. *Electroplating and Metal Finishing*, v. 6, Nov. 1953, p. 411-413.

Equipment and procedures. Tables. (L17, Sn, Zn)

34-L. The B.N.F. Jet Test on Organic Bright Nickel Deposits. *Electroplating and Metal Finishing*, v. 6, Nov. 1953, p. 417-418.

Variations in the rate of penetration of coatings during thickness measurement. Graph. 3 ref. (L17, Ni)

35-L. Porosity of Sprayed Coatings. D. de Paauw. *Electroplating and Metal Finishing*, v. 6; *Metal Spraying*, v. 3, Nov. 1953, p. 435-436, 438.

Origin and effect of porosity in sprayed metal coatings, its measurement and effect of operating variables. Tables. (To be continued.) (L23)

36-L. Finishing of New Republic Steel Kitchens. *Industrial Heating*, v. 20, Nov. 1953, p. 2255-2256, 2258-2260, 2262, 2264, 2268, 2270.

Production of a new improved line of steel kitchen cabinet and sink equipment has recently begun at Berger Mfg. Div., Republic Steel Corp., Canton, Ohio. Photographs. (L27)

37-L. Finishing by Tumbling. J. Lomas. *Machinery Lloyd (Overseas Ed.)*, v. 25, Nov. 1953, p. 85-87.

Tumbling applications, equipment and operating procedures. (L10)

38-L. Electroplating Prior to Hot Galvanizing for Improved Results. Allen T. Baldwin. *Metal Progress*, v. 64, Dec., 1953, p. 76-81.

Specimens of A.I.S.I. 1010 steel with thin precoats of zinc, tin, nickel and iron compared with specimens galvanized with no precoat. Early indications show the process may be economical if more efficient heating methods are adopted. Microphotographs. (L17, L16, CN, Zn, Sn, Ni, Fe)

39-L. Diffusion Coatings. *Metal Progress*, v. 64, Dec. 1953, p. 122, 124.

Digest of "Diffusion Coatings", D. M. Dovey, R. Jenkins and K. C. Randle, *Journal of the Institute of Metals, Symposium on Properties of Metals*, 1952, p. 213-236. Principles and practices of applying metallic or ceramic coatings for protection and to save critical materials. (L15)

40-L. Reflectivity of Aluminum Pigments and Paint. II. F. B. Rethwisch, G. M. Babcock and E. C. Riggs. *Paint, Oil, & Chemical Review*, v. 116, Nov. 19, 1953, p. 22, 24.

Results of experimental studies on pigments, from coarsest to finest, in paste and powder form. Results are a function of vehicle characteristics, pigment concentration and spraying technique. Tables. (L26, Al)

41-L. A Metallographic Study of Some Steels Used for Nickel Plating. A. E. R. Westman and F. A. Mohrnheim. *Plating*, v. 40, Dec. 1953, p. 1366-1372; disc., p. 1373-1375.

Study to find what range of steels was being used in electroplating; perfect current techniques for studying the zone of contact between the basis metal and the electroplate; and to determine some plating failures in which the basis metal might be at fault. Diagrams, photographs. 9 ref. (L17)

42-L. The Analysis of Electroplating Solutions for Major Constituents. Earl J. Serfass. *Plating*, v. 40, Dec. 1953, p. 1385-1389; disc., p. 1389-1390.

Analyzes available methods for determination of macroconstituents in chromium, silver, nickel and brass plating baths. Tables, diagrams. (L17, M28, Cr, Ag, Ni)

43-L. Effect of Impurities and Purification of Electroplating Solutions. I. Nickel Solutions. D. T. Ewing. *Plating*, v. 40, Dec. 1953, p. 1391-1400; disc., p. 1400.

Effects of hexavalent and trivalent Cu on the appearance, adhesion, ductility, salt-spray (fog) corrosion resistance, hardness and throwing power of nickel deposits. Graphs, tables. 12 ref. (L17, Ni, Cu)

44-L. The Analyst's Function in the Electroplating Industry. K. E. Langford. *Product Finishing*, v. 6, Nov. 1953, p. 48-55.

Attempts to cover new ground by discussing function of the analytical chemist as an individual within the framework of the electroplating industry. Photographs. (L17, S11)

45-L. Metallizing Non-Metallic Surfaces. *Product Finishing*, v. 6, Nov. 1953, p. 74-78, 110.

Reviews five main methods at present available for use with ceramics, glass and plastics. Tables. (L23)

46-L. Review of Electroplating Plant. I. *Product Finishing*, v. 6, Nov. 1953, p. 79-88.

Representative selection of generators, rectifiers, plating vats and plating barrels. Photographs. (L17)

47-L. Selection of Metal Cleaning Cycles. Samuel Spring. *Steel*, v. 133, Nov. 16, 1953, p. 112-114.

Importance of water in terms of hardness and rinsability. Other factors to be considered in selection of cleaner. Photographs, table. (L12)

48-L. (German.) Studies on the Anodic Behavior of Nickel. II. G. Trümpler and W. Saxer. *Helvetica Chimica Acta*, v. 36, no. 6, 1953, p. 1630-1639.

Comparative experiments on two electrodes of high and highest purity nickel with special consideration of the course of passivation in dependence upon the "critical" potential. Tables, graphs. 14 ref. (L17, Ni)

49-L. (German.) Plant Experiences With Pot-Galvanizing Installations for Wire. Jürgen-Echter Becker. *Stahl und Eisen*, v. 73, no. 22, Oct. 22, 1953, p. 1385-1391.

Functions, operations and results of hot galvanizing wire plant devices. Photographs, diagrams. 6 ref. (L16, ST, Zn)

50-L. (German.) Phosphatizing Steel Wire in Wire Mills. Hans Berkenhoff. *Stahl und Eisen*, v. 73, no. 22, Oct. 22, 1953, p. 1391-1394.

Experiences in bonderizing wire. Industrial procedure and prospects for use in the wire manufacturing industry. 11 ref. (L14, ST)

51-L. (Russian.) Problems of Bright Tinning. G. I. Chufarov, M. G. Zhuravleva, E. P. Tatievskaia, B. D. Averbukh and V. K. Antonov. *Zhurnal Prikladnoi Khimii*, v. 26, no. 6, June 1953, p. 652-655.

Boiling point of flux is an important characteristic which varies with the water content. Tables, graphs. (L16, Zn, Sn)

52-L. (Book.) The Filtration and Pumping of Plating Solutions. G. T. Colegate. 56 p. 1953. Electroplating and Metal Finishing, 83-85 Udney Park Road, Teddington, Middlesex, England. 7/6d.

Deals comprehensively with the various types of filters and pumps in use for plating solutions. (L17)

53-L. (Book.) Finishing Handbook and Directory. 512 p. 1953. Sawell Publications Ltd., 4 Ludgate Circus, London, E. C. 4, England. 21s-0d.

New and revised sections on vacuum deposition, vitreous enamel, marking, and transfer processes. (L general)

54-L. (Book—German.) (Practical Electrochemistry) Praktische Elektrochemie. V. Gaertner. 512 p. 1952. Verlag für Jugend und Volk, Vienna. $11.90.

Includes recent developments in electroplating. (L17, C23)

M

Metallography, Constitution and Primary Structures

1-M. Constitution of the Copper-Rich Copper - Aluminum - Germanium Alloys. G. V. Raynor and P. Greenfield. *Institute of Metals, Journal*, v. 82,, Oct. 1953, p. 59-64.

Examination by metallographic and X-ray methods at 700, 600 and 550° C. Diagrams, tables, 6 ref. (M24, Cu, Al, Ge)

2-M. The Copper-Indium Eutectoid at 81.36 Wt.-% Indium. Chester W. Spencer and David J. Mack. *Institute of Metals, Journal*, v. 82, Oct. 1953, p. 81-85 + plates XIV, IV.

Experimental work undertaken to determine structure. Graphs. 8 ref. (M24, Cu, In)

3-M. The Free-Energy Diagram of the System Titanium-Oxygen. O. Kubaschewski and W. A. Dench. *Institute of Metals, Journal*, v. 82, Oct. 1953, p. 87-91.

Experimental procedure to obtain data in order to construct free energy concentration curves of Ti-O system. Tables, diagram. 15 ref. (M24, P12, Ti)

4-M. Standard X-Ray Diffraction Powder Patterns. v. 1. Data for 54 Inorganic Substances. Howard E. Swanson and Eleanor Tatge. *National Bureau of Standards Circular* 539, June 15, 1953. 95 p.

Sets of patterns in the National Bureau of Standards file for 16 pure metals and 38 inorganic substances reviewed with the object of supplanting them with single standard patterns. Tables. 264 ref. (M22, Mg, Al, Ni, Cu, Zn, Ge, Mo, Pd, Ag, Sn, Te, W, Ta, Pt, Au, Pb)

5-M. Electron Microscopic Observation of 111 Faces of ZnS Crystals. W. Dekeyser, S. Amelinckx, E. Votava and G. Vandermeerssche. *Philosophical Magazine*, v. 44, 7th ser., no. 357, Oct. 1953, p. 1142-1144.

Growth fronts and slip lines. 6 ref. (M21, M26, Q24, Zn)

6-M. Metallic Carbides and Nitrides of the Type MX. William Hume-Rothery. *Philosophical Magazine*, v. 44, 7th ser., no. 357, Oct. 1953, p. 1154-1160.

Face-centered cubic arrangement with metal atoms is favored because it provides metallic atoms with mutually perpendicular bonds to six neighbors. Tables. 10 ref. (M26)

7-M. (German.) Formation of Metallic Properties in Ionic and Valence Lattices. H. Krebs. *Naturwissenschaften*, v. 40, no. 20, 1953, p. 525-526.

Examples to show that the width of the forbidden zone in crystals decreases with increasing resonance between *p*-electrons to form metallic conductors. Diagrams. 9 ref. (M26)

8-M. (German.) X-Ray Studies of Titanium Nitride and Titanium Carbide Surface Coatings. A. Münster and K. Sagel. *Zeitschrift für Elektrochemie*, v. 57, no. 7, 1953, p. 571-579.

Determination of lattice constants. X-ray methods of measuring film thickness and the phenomena of oriented crystal growth in titanium nitride films. Tables, graphs, micrographs. 22 ref. (M26, Ti)

9-M. Solidification of Steel. II. Structure, Segregation, and Non-Metallic Inclusions. T. B. King. *Iron & Steel*, v. 26, Nov. 1953, p. 513-520.

Reviews cast structure; theory and factors affecting segregation; and types, size, distribution and effects of inclusions. 95 ref. (M27, M28, N12, ST)

10-M. The Habit Plane of Beta in Alpha Titanium. Paul A. Albert. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1449-1450.

Experimental procedure to determine the above and method of analysis. Photographs, diagram. 4 ref. (M26, Ti)

11-M. The Silver-Cadmium Beta and Zeta Phases. L. Muldawer, M. Amsterdam and F. Rothwarf. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Minning and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1458-1459.

X-ray diffraction studies on beta-prime region of the system. Table, graph. 8 ref. (M22, M24, Ag, Cd)

12-M. Neptunium-Aluminum Intermetallic Compounds. O. J. C. Runnalls. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1460-1462.

X-ray diffraction methods were used to study above. Tables, diagrams, photograph. 7 ref. (M22, M26, Np, Al)

13-M. Titanium-Rich Regions of the Ti-C-N, Ti-C-O, and Ti-N-O Phase Diagrams. L. Stone and H. Margolin. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1498-1502.

Studies in the above. Diagrams, photographs, table. 10 ref. (M24, Ti)

14-M. The Molybdenum-Boron System. Paul W. Gilles and Bernard D. Pollock. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1537-1539.

Studies in phase diagram at high temperatures. Diagram, table. 3 ref. (M24, Mo, B)

15-M. The Partition of Some Alloying Elements Between Carbide and Ferrite in Steels. D. A. Scott and G. S. Farnham. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1541-1543.

Studies in the above. Reports partition of one element is not much affected by presence of another. Tables. 7 ref. (M26, ST, Ni, Mn, Mo, Cr)

16-M. System Titanium-Chromium-Molybdenum. R. P. Elliott, B. W. Levinger and W. Rostoker. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1544-1549.

Studies in phase equilibria of the above. Table, diagrams, graphs. 12 ref. (M24, Ti, Cr, Mo)

17-M. Metallographic Structures in Commercial Titanium. Roman Osadchuk, William P. Koster and John F. Kahles. *Metal Progress*, v. 64, Nov. 1953, p. 93-96.

Etching, heat tinting and phase identification. Micrographs. (M21, M27, Ti)

18-M. Metallography of Highly Radioactive Materials. M. J. Feldman.

Metal Progress, v. 64, Nov. 1953, p. 97-102.

Equipment and procedures for specimen preparation and examination by remote control. Photographs, micrographs. (M21, EG-h)

19-M. Stable Dislocations in the Common Crystal Lattices. E. C. Frank and J. F. Nicholas. *Philosophical Magazine*, v. 44, 7th ser., no. 358, Nov. 1953, p. 1213-1235.

On the assumption that the energy per unit length of a dislocation line is proportional to the square of the Burgers vector, the stability of dislocations in simple cubic, face-centered cubic, diamond, hexagonal close-packed and body-centered cubic lattices is discussed. Diagrams, tables. 5 ref. (M26)

20-M. Formation of Sigma Phase in the Mn-Mo System. B. F. Decker, R. M. Waterstrat and J. S. Kasper. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1476.

Two methods of preparation. Tables. 3 ref. (M26, Mo, Mn)

21-M. (English.) Light Figures of Bismuth Single Crystals and the Determination of Their Crystal Orientations by the Light-Figure Method. II. Light Figures. III. Orientation Determination by Light Figures. Mikio Yamamoto and Denjiro Watanabé. *Science Reports of the Research Institutes, Tohoku University*, Series A, v. 5, no. 2, Apr. 1953, p. 124-146.

Light figures produced by etching with various reagents observed and crystal orientations determined. Diagrams, photographs, tables. 4 ref. (M21, M26, Bi)

22-M. (English.) Electron Diffraction Study on the Selective Oxidation of Copper-Aluminium Alloys. Denjiro Watanabe, Shiro Ogawa and Takashi Kimura. *Science Reports of the Research Institutes, Tohoku University*, Series A, v. 5, no. 3, June 1953, p. 238-253.

Oxide films on alloys containing 1 to 10% aluminum. Attempts made to correlate the nature of films, the treatment temperature and discoloration resistance to various acids. Tables, graphs, diagrams. (M22, Cu, Al)

23-M. How to Tell a Good High Speed Tool When You See One in a Microscope. Michael J. Antus and Birger L. Johnson. *Steel*, v. 133, Nov. 23, 1953, p. 88-89.

Micrographs showing distribution of carbides, heat treated structure, surface condition and austenitic grain size. (M27, TS)

24-M. (Czechoslovakian.) Investigation of Nonmetallic Inclusions in Steel. Miroslav Sicha. *Hutnické Listy*, v. 8, no. 10, Oct. 1953, p. 506-512.

Samples were prepared and inclusions examined by chemical analysis, X-ray diffraction and metallographic techniques. Diagrams, graphs. (To be continued.) (M21, M22, S11, ST)

25-M. (Russian.) "Dew" Method as Applied in the Investigation of Spiral Step Growth. N. V. Gliki. *Doklady Akademii Nauk SSSR*, v. 90, no. 4, June 1, 1953, p. 541-543.

A jet of warm moist air directed against carefully cleaned surface causes small changes in the contours to stand out in relief. Micrographs. 7 ref. (M23)

26-M. (Russian.) Basic Types of Constitution Diagrams of Titanium-Base Binary Systems. I. I. Kornilov. *Doklady Akademii Nauk SSSR*, v. 91, no. 3, July 21, 1953, p. 549-552.

Position in the periodic system of titanium and its alloying elements and similarity or differences of their chemical properties determine characteristics of their interactions and consequently the types of phase diagrams. Graphs. 16 ref. (M24, Ti)

27-M. (Russian.) Calculation of the Intensity of Diffuse X-Ray Dispersion of Various Degrees of Order in the Position of Defects in Crystals. Iu. A. Bagariatskii. *Doklady Akademii Nauk SSSR*, v. 92, no. 6, Oct. 21, 1953, p. 1157-1160.

Problem of diffuse X-ray dispersion on a one-dimensional case when positions of defects in crystal are irregular. Graphs. (M26)

28-M. (Russian.) X-Ray Microphotography and X-Ray Microscopy. D. B. Gogoberidze. *Uspekhi Fizicheskikh Nauk*, v. 50, no. 4, Aug. 1953, p. 577-599.

A medium with a smaller wavelength was developed to increase the resolving power of microscopes. Micrographs, diagrams. 43 ref. (M21)

N
Transformations and Resulting Structures

1-N. (French.) Hydrogen in Pig Iron and Steel. Paul Bastien. *Fonderie*, 1953, Sept., no. 92, p. 3579-3598.

Solubility of hydrogen in liquid iron and phenomena accompanying solidification. Analytical methods of determining hydrogen in steels and results obtained. Effect of hydrogen on pig iron crystallization, formation of air holes, graphitization and plastic deformation. Tables, graphs, diagrams, photographs. 55 ref. (N12, Q24, Fe, ST)

2-N. (French.) The Growth of Metal Grains. Paul Lacombe. *Metaux, Corrosion-Industries*, v. 28, no. 338, Oct. 1953, p. 377-391.

Literature review. Attempts to clarify conceptions and confusion in terminology, especially with respect to primary recrystallization and continued and discontinued growth. Micrographs. 35 ref. (N3, N5, Al, Zn)

3-N. Diffusion and Solubility of Boron in Iron and Steel. Paul E. Busby, Mary E. Warga and Cyril Wells. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1463-1468.

Reports diffusion rate of boron about same as carbon in austenite. Solubility at normal heat treating temperatures is less than 0.001%. Tables, graphs, diagrams. 22 ref. (N1, B, Fe, ST)

4-N. On the Theory of the Formation of Martensite. M. S. Wechsler, D. S. Lieberman and T. A. Read. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1503-1515.

A theoretical analysis of austenite-martensite transformation which predicts habit plane, orientation relationships and macroscopic distortions from a knowledge only of crystal structures of initial and final phases. Diagrams, tables. 21 ref. (N9, ST)

5-N. Diffusionless Phase Change in the Indium-Thallium System. M. W. Burkart and T. A. Read. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1516-1524.

Crystal geometry of cubic-tetragonal interface after partial transformation of an indium-thallium alloy single crystal. General theory. Effects of applied stress interpreted. Diagrams, photographs, graphs. 15 ref. (N6, In, Tl)

6-N. Effects of Sample Surface and X-Ray Diffraction Camera Geometry on the Determination of Retained Austenite in Hardened Steels. Karl E. Beu and Donald P. Koistinen. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1529-1530.

Experiments to determine effect of irregular surfaces on reliability of austenite determinations. Diagram, table. 7 ref. (N8, AY)

7-N. Calculation of Interdiffusion Coefficients When Volume Changes Occur. Morris Cohen, Carl Wagner and J. E. Reynolds. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1534-1536.

Suggests modifications necessary in order for diffusion equation to retain its usual form. 9 ref. (N1)

8-N. Notes on the Determination of Retained Austenite by X-Ray Methods. Karl E. Beu. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1539-1540.

Factors affecting reliability of the determination. Diagram. 4 ref. (N8, M22, AY)

9-N. Theory of Plasma Waves in Metals. Peter A. Wolff. *Physical Review*, v. 92, ser. 2, Oct. 1, 1953, p. 18-23.

The effect of the crystal lattice on plasma oscillations was investigated by the Hartree approximation. Earlier works are reviewed. 14 ref. (N10, Cu, Ni, Ag, Be, Al)

10-N. (French.) Electron Microscopic Observations of the Effect of Recrystallization on the Substructure of Copper. Laurence Delisle. *Revue de métallurgie*, v. 50, no. 10, Oct. 1953, p. 665-682.

Relationship between the substructures and mechanical and thermal treatment of the metal. Experimental details. Tables, micrographs. 22 ref. (N5, M21, Cu)

11-N. A Study of the Propagation Mode for Metallic Vapors in Shadow-Casting by Vacuum Evaporation of Au^{198} and Cr^{51}. L. E. Preuss. *Journal of Applied Physics*, v. 11, Nov. 1953, p. 1401-1409.

Special method introduced for quantitatively determining metal-evaporation mechanism using metallic Au and Cr, tagged with pile-produced Au^{198} and Cr^{51}. Graphs, tables, photographs. (N15, S19, Au, Cr)

12-N. Diffusion of Calcium Ion in Liquid Slag. Helen Towers, Michel Paris and John Chipman. *Journal of Metals*, v. 5; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, Nov. 1953, p. 1455-1458.

A simple radioactive tracer technique used to measure diffusion coefficient of calcium ion in molten slags. Diagram, graphs, photograph. 8 ref. (N1, B21, S19)

13-N. Production of Oriented Single-Crystal Silicon Iron Sheet. C. G. Dunn and G. C. Nonken. *Metal Progress*, v. 64, Dec., 1953, p. 71-75.

Equipment and techniques. Photographs, diagrams. (N5, Fe)

14-N. (Russian.) Local Distortions of the Crystalline Lattice During Phase Hardening. L. Moroz and T. Mingin. *Doklady Akademii Nauk SSSR*, v. 91, no. 2, July 11, 1953, p. 249-251.

Concludes that a considerably smaller quantity of atoms which

were not coherent were formed as a result of static distortions of the lattice than in the case of plastic deformation. Tables. 9 ref. (N6, M26, Fe)

15-N. (Russian.) Influence of Pressure on the Eutectoid Dissociation in Copper-Aluminum Alloy. M. I. Zakharova. *Doklady Akademii Nauk SSSR*, v. 91, no. 2, July 11, 1953, p. 287-289.

Copper alloys containing 12.5% aluminum prepared from electrolytic metals were used. Application of pressure in the quenching process after annealing increases the temperature of the start and completion of eutectoid dissociation. 4 ref. (N9, Cu, Al)

16-N. (Russian.) Effect of Cobalt on Carbon Diffusion in Iron-Carbon Alloys. V. A. Iurkov and M. A. Krishtal. *Doklady Akademii Nauk SSSR*, v. 92, no. 6, Oct. 21, 1953, p. 1171-1173.

Experimental results of diffusion process in cast iron alloyed with cobalt. Graphs. 6 ref. (N1, Fe, Co)

P

Physical Properties and Test Methods

1-P. Electrical Interaction of a Dislocation and Solute Atom. A. H. Cottrell, S. C. Hunter and F. R. N. Nabarro. *Philosophical Magazine*, v. 44, 7th ser., no. 357, Oct. 1953, p. 1064-1067.

Motts' estimate of the effective charge used to calculate the electrical interaction of a solute atom in copper alloys. 11 ref. (P15, Cu)

2-P. Surface Recombination in Germanium. W. N. Reynolds. *Physical Society, Proceedings*, v. 66, no. 406B, Oct. 1953, p. 899-901.

Studied by carrier injection into a long germanium block swept by an electric field and operated in a variable magnetic field at a right angle. Graphs. 4 ref. (P16, Ge)

3-P. The Superconducting and Normal Heat Capacities of Niobium. A. Brown, M. W. Zemansky and H. A. Boorse. *Physical Review*, v. 92, ser. 2, Oct. 1, 1953, p. 52-58.

Studied from 2.5 to 11° K. Transition temperature was found to be 8.70 ± 0.10° K. Diagrams, tables, graphs. 15 ref. (P11, P12, Nb)

4-P. The Vibrational Spectrum and Specific Heat of Sodium. E. Bauer. *Physical Review*, v. 92, ser. 2, Oct. 1, 1953, p. 58-67.

Spectrum derived by method suggested by Houston. The lattice part of the specific heat of metallic Na is calculated as a function of temperature. Tables, graphs. 17 ref. (P12, Na)

5-P. Some Magnetic Properties of Metals. VI. Surface Corrections to the Landau Diamagnetism and the de Haas-van Alphen Effect. R. B. Dingle. *Royal Society, Proceedings*, v. 219, ser. A, Oct. 7, 1953, p. 463-477.

Calculations and characteristic of large systems of electrons. 13 ref. (P16)

6-P. The Measurement of the Thermal Expansion of Single Crystals of Indium and Tin With a Photoelectric Recording Dilatometer. E. C. Vernon and S. Weintroub. *Physical Society, Proceedings*, v. 66, no. 405B, Oct. 1953, p. 887-894.

Dilatometer described. Thermal expansion of two tin and seven indium crystals measured. Crystals were made by slow solidification. Tables, graphs, diagrams. 21 ref. (P11, M23, Sn, In)

7-P. (German.) Secondary Electron Emission of Semiconductors. H. Gobrecht and F. Speer. *Zeitschrift für Physik*, v. 135, no. 5, 1953, p. 602-614.

Influence of impurity content of germanium, selenium, gallium, antimony, thallium and bismuth crystals on secondary electron emission. Diagrams, graphs, tables. 15 ref. (P15, Ge, Se, Ga, Sb, Tl, Bi)

8-P. The Energy State of Fatigued Copper. B. Welber and R. Webeler. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1558-1559.

Calorimetetric investigations. Table, graphs. 2 ref. (P12, Q7, Cu)

9-P. The Surface Free Energy of a Metal. I, Normal State. II. Superconducting State. R. Stratton. *Philosophical Magazine*, v. 44, 7th ser., no. 358, Nov. 1953, p. 1236-1258.

A mathematical analysis. Diagrams, tables. 14 ref. (P12, Cu)

10-P. (French.) Supplementary Electrical Resistance and Thermo-Electric Force Due to Vacancies in Metals. Florin Abeles. *Comptes rendus*, v. 237, no. 15, Oct. 12, 1953, p. 796-798.

Proposes a model based on the Born approximation. Results compared with experimental values for silver, gold and copper. 4 ref. (P15, Ag, Au, Cu)

11-P. (German.) Thermodynamics of Several Reactions of Titanium Tetrachloride. A. Münster and W. Ruppert. *Zeitschrift für Elektrochemie*, v. 57, no. 7, 1953, p. 558-564.

Critical discussion of published data. Thermodynamic computations of titanium tetrachloride reactions with different reagents. Tables, graphs. 26 ref. (P12, Ti)

12-P. (German.) The Aging of Permanent Magnets. Klaus J. Kronenberg. *Zeitschrift für angewandte Physik*, v. 5, no. 9, Sept. 1953, p. 321-329.

Ballistic precision measurements to study effects of a variety of conditions on pseudo-remanence of different alloyed permanent magnet steels. Graphs, 17 ref. (P16, AY)

13-P. (Russian.) Effect of Boron on Electric Conductivity of Ingot Aluminum and of Refined Metal. A. Domon and R. K. Vassel. *Acta Technica Academiae Scientiarum Hungaricae*, v. 7, nos. 1-2, 1953, p. 159-163.

Measurements of electrical conductivity of high-purity and of ordinary ingot aluminum alloyed with boron and with boron and titanium. Mechanism of refining with boron. Graphs. 3 ref. (P15, Al, Ti, B)

14-P. The Heat Capacity and Entropy of Thorium From 18 to 300° K. Maurice Griffel and Richard E. Skochdopole. *American Chemical Society, Journal*, v. 75, Nov. 5, 1953, p. 5250-5251.

Experimental data tabulated with enthalpy and Gibbs function as functions of temperature. Tables. 17 ref. (P12, Th)

15-P. The Permeability of Silicon-Iron at Very Low Flux Densities. Eberhard Both. *Communication and Electronics*, 1953, Nov., p. 656-661; disc., p. 661-664.

Measurements on specimens containing 3.25% silicon and annealed at various temperatures. Graphs, tables. 6 ref. (P16, Si, Fe)

16-P. Effect of Chromium on the Thermodynamic Activity of Carbon in Liquid Iron. F. D. Richardson and W. E. Dennis. *Iron and Steel Institute, Journal*, v. 175, Nov. 1953, p. 257-263.

Studies in the temperature range 1560-1660° C., at chromium concentrations of 10-80%. Results expressed in terms of the activity coefficient of carbon, which is markedly lowered by the chromium. Graphs, tables. 10 ref. (P12, Fe, Cr)

17-P. The Equilibrium Controlling the Decurburization of Iron-Chromium-Carbon Melts. W. E. Dennis and F. D. Richardson. *Iron and Steel Institute, Journal*, v. 175, Nov. 1953, p. 264-266.

Limiting carbon concentrations that can be reached for various chromium contents of the melt were calculated and shown to be in agreement with experimental determinations. Graphs. 6 ref. (P12, Fe, Cr)

18-P. (English.) Longitudinal Magnetostriction in Nickel-Cobalt Alloys. Mikio Yamamoto and Ryofu Miyasawa. *Science Reports of the Research Institutes, Tohoku University*, Series A, v. 5, no. 1, 1953, p. 22-33.

Longitudinal magnetostriction in magnetic fields up to 900 oersteds measured by an optical-lever method. Dependency of the magnetostriction upon alloy composition, magnetic field and intensity of magnetization. Graphs. 13 ref. (P16, Co, Ni)

19-P. (English.) On the Reduction Equilibrium Diagram of Iron Oxide. Koji Sanbongi. *Science Reports of the Research Institutes, Tohoku University*, Series A, v. 5, no. 1, Feb. 1953, p. 53-62.

The author corrected his previous reduction equilibrium diagram for the Fe-C-O system. Data for the Fe-H-O system calculated. Diagrams, tables. 10 ref. (P12, Fe)

20-P. (English.) On the Magnetostrictive Constants of Face-Centered Cubic Nickel-Cobalt Alloys. Mikio Yamamoto and Ryofu Miyasawa. *Science Reports of the Research Institutes, Tohoku University*, Series A, v. 5, no. 2, Apr. 1953, p. 113-123.

An expression was derived for the saturation magnetostriction of polycrystalline specimens. Graphs. 16 ref. (P16, Co, Ni)

21-P. (English.) On the Anomaly of the Specific Heat at High Temperatures in Alpha Phase Alloys of Iron and Chromium. Hakaru Masumoto, Hideo Saito and Makoto Sugihara. *Science Reports of the Research Institutes, Tohoku University*, Series A, v. 5, no. 3, June 1953, p. 204-207.

Measurements on quenched or annealed iron alloys, containing up to 55% chromium, at temperatures up to 900° C. Graphs. (P12, Fe, Cr)

22-P. (English.) On Activities of Coexisting Elements in Molten Iron. I. The Activity of Carbon in Molten Iron. Koji Sanbongi and Masayasu Ohtani. *Science Reports of the Research Institutes, Tohoku University*, Series A, v. 5, no. 3, June 1953, p. 263-270.

Change in carbon content was determined by measuring electromotive force in a concentration cell. Activity values calculated and equilibrium relations in the iron-carbon-oxygen system examined. Graphs, diagrams. 17 ref. (P12, Fe)

23-P. (Russian.) Investigation of Thin Films of Intermetallic Compounds. A. K. Kikoin and G. D. Fedorov. *Doklady Akademii Nauk SSSR*, v. 92, no. 6, Oct. 21, 1953, p. 1163-1165.

Components of a system were deposited on a plate by evaporation in a vacuum. Preparations investigated to determine optical properties for dielectrics. Graphs, micrograph. 4 ref. (P17, Mg, Sb)

24-P. (Russian.) Calculation of the Energy of Distortion of the Lattice

of the Third Type Depending on the Magnitude of Deformation. N. S. Fastov. *Doklady Akademii Nauk SSSR*, v. 92, no. 6, Oct. 21, 1953, p. 1167-1170.

Energy of residual stresses found to be dependent on magnitude of uniform deformation in tension or compression. Graphs. 3 ref. (P12)

25-P. (Russian.) **Investigation of the Surface Tension of the Alloy Lead-Cadmium on the Boundary With Molten Eutectics LiCl-KCl and in Vacuum.** V. A. Kuznetsov, V. P. Kochergin, M. V. Tishchenko and E. G. Pozdnysheva. *Doklady Akademii Nauk SSSR*, v. 92, no. 6, Oct. 21, 1953, p. 1197-1199.

Electrocapillary phenomena of surface tension in a vacuum. All measurements made at temperatures above 450° C. Graphs. 11 ref. (P10, Pb, Cd)

26-P. (Russian.) **Solubility of Oxygen in Iron-Chromium and Iron-Chromium-Nickel Melts.** B. V. Linchevskii and A. M. Samarin. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1953, no. 5, May, p. 691-704 + 4 plates.

Studies of the influence of chromium on oxygen solubility. Oxidation equations for chromium dissolved in liquid iron. Tables, graphs, micrographs. 3 ref. (P13, Fe, Ni, Cr)

Q

Mechanical Properties and Test Methods; Deformation

1-Q. The Geometry of the Pyramidal Indentation in the Hardness Testing of Involute Gear Teeth. N. J. C. Peres. *Australian Journal of Applied Science*, v. 4, Sept. 1953, p. 389-394.

Equations for obtaining true hardness values from indentations on curved surfaces. (Q29)

2-Q. The Effect of Iron, Manganese, and Chromium on the Properties in Sheet Form of Aluminium Alloys Containing 0.7% Magnesium and 1.0% Silicon. R. Chadwick, N. B. Muir and H. B. Grainger. *Institute of Metals, Journal*, v. 82, Oct. 1953, p. 75-80 + plates X-XIII.

After solution heat treatment and room-temperature aging, the mechanical properties varied only slightly with composition. Artificial aging increased susceptibility to intercrystalline corrosion. Table, diagrams. 16 ref. (Q general, R1, Al)

3-Q. The Effect of Cold Work on an Iron-Manganese Alloy. J. Gordon Parr. *Institute of Metals, Journal*, v. 82, Oct. 1953, p. 91, 92.

Metastable phases are produced in quantities which depend upon extent of cold working. Tables. 3 ref. (Q24, Fe, Mn)

4-Q. Impact Properties of Annealed Spheroidal-Graphite Cast Iron. A. L. Carr and W. Steven. *Metal Treatment and Drop Forging*, v. 20, Oct. 1953, p. 455-461.

Abridged version of authors' contribution to International Foundry Congress, in Paris, Sept. 19-27. Tests made in temperature range of −150 to +300° C. Transition temperature found to depend on silicon, manganese and phosphorus content. Photographs, tables, graphs. 13 ref. (Q6, CI, Si, Mg, Mn, P)

5-Q. Scratch Hardness Measurement With a Diamond Pyramid. T. Land and B. Sugarman. *Metal Treatment and Drop Forging*, v. 20, Oct. 1953, p. 464-466.

Based on paper presented before Sheet and Strip Metal Users' Technical Association. Comparison of scratch and indentation hardness tests. Photographs, graphs. 2 ref. (Q29)

6-Q. The Plastic Flow of Iron and Plain Carbon Steels Above the A2 Point. P. Feltham. *Physical Society, Proceedings*, v. 66, no. 406B, Oct. 1953, p. 865-883.

Strain rate is function of applied stress, absolute temperature, latent heat of melting and volume per atom. Transient strain equation. Tables, graphs, diagrams. 31 ref. (Q24, Fe, Cn)

7-Q. Dislocations and Plastic Deformation. W. T. Read, Jr. *Physics Today*, v. 6, Nov. 1953, p. 10-13.

Reviews fundamental concepts concerning the above in certain ductile materials. Reports that small and exceedingly rare defects in structure of solids are "weak links" that determine strength of materials. Diagrams. 2 ref. (Q24, M26)

8-Q. (French.) **Modification of A-S 4 G by Sodium.** *Fonderie*, 1953, Sept., no. 92, p. 3613-3615.

Experiments for determining effect of sodium additions on mechanical properties and structure of light alloys with a low silicon content. Practical implications of results. Tables, graphs, micrographs. (Q general, M27)

9-Q. (French.) **Relationship Between Mechanical Characteristics and Texture of Directly Extruded Aluminum Alloys.** Jean Navarro and Robert Tertian. *Revue de l'Aluminium*, v. 30, no. 202, Sept. 1953, p. 299-306.

Mechanical properties influenced more by the complex textures in nonsymmetrical extrusions than by the normal textures of round and square extrusion. Photographs, diagrams, tables, micrographs. 4 ref. (Q general, Q24, Al)

10-Q. (French.) **The Behavior of Thick-Walled Pipes Submitted to High Pressures.** L. Deffet and J. Gelbgras. *Revue universelle des mines*, v. 9, ser. 9, no. 10, Oct. 1953, p. 725-740.

Various methods for measuring the distension. Results with mild and semihard steels. Photographs, tables, diagrams, graphs. 23 ref. (Q25, CN)

11-Q. (German.) **Alloying Elements in Steel and Their Importance in Steam-Boiler Design.** H. Buchholtz. *Brennstoff-Wärme-Kraft*, v. 5, no. 10, Oct. 1953, p. 358-359.

Mechanical properties of different alloy steels at elevated temperatures. Graph, table. (Q general, AY)

12-Q. (German.) **Comparison of Radiographic and Magnetic Methods of Determining Internal Stresses of Nickel.** Eugen Kappler and Ludwig Reimer. *Naturwissenschaften*, v. 40, no. 20, 1953, p. 523-524.

Literature review. 7 ref. (Q25, Ni)

13-Q. Fatigue Life of Thick-Skinned Tension Joints. Edward W. Thall, Jr. *Aeronautical Engineering Review*, v. 12, Nov. 1953, p. 37-46.

Tests run on number of panels representing various splice designs to determine ways of improving life of joint. Diagrams, photographs, graph. 1 ref. (Q7, K12)

14-Q. The Influence of Surface Rolling on the Fatigue Strength of Cast Iron. G. N. J. Gilbert and K. B. Palmer. *British Cast Iron Research Association. Journal of Research and Development*, v. 5, Oct. 1953, p. 71-77 + 1 plate.

Experiments on V-notched specimens of a pearlitic flake graphite cast iron. Graphs, photographs, tables. (Q7, G23, CI)

15-Q. Static Load Carrying Capacity of Steels. Effect of Heat Treatment. R. G. B. Yeo and T. Ko. *Iron & Steel*, v. 26, Nov. 1953, p. 498-500.

Investigations on effects of hardness of through-hardened carbon steel and of case thickness, variation of hardness, and prequenching treatment of Krupp steel. Photographs, graphs. 6 ref. (Q23, Q29, J general, CN, AY)

16-Q. Effects of Temperature on the Flow and Fracture Characteristics of Molybdenum. J. H. Bechtold. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1469-1475.

Tensile properties of annealed molybdenum were investigated from 1000 to −200° C. Graphs, photographs, diagram, table. 17 ref. (Q23, Mo)

17-Q. Bending of Molybdenum Single Crystals. K. T. Aust, R. Maddin and N. K. Chen. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1477-1482.

Lattice rotations occurring on tension and compression sides during bending of molybdenum single crystals at room temperature. Observations concerning crystallite rotations and slip traces. Crystallite fragmentation also noted. Table, graph, photographs, diagrams. 11 ref. (Q5, M26, Mo)

18-Q. Kink Band Formation in High Purity Aluminum During Creep at High Temperatures. Andre M. Gervais, John T. Norton and Nicholas J. Grant. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1487-1492.

X-ray Laue back-reflection technique was used in conjunction with metallographic studies to determine crystallographic elements involved in kinking and to measure rotations of bands. Diagrams, photographs, table. 16 ref. (Q3, Al)

19-Q. The Properties of Sand Cast Mg-Th-Zn-Zr Alloys. K. E. Nelson. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1493-1497.

Effect of thorium and zinc variations on strength and 100-hr. creep characteristics of magnesium, thorium, zinc and zirconium alloys. Tables, diagrams, photographs. 28 ref. (Q23, Q3, Mg, Th, Zn, Zr)

20-Q. Some Observations on the Work Hardening of Metals. E. H. Edwards, Jack Washburn and Earl R. Parker. *Journal of Metals*, v. 5, Nov. 1953; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 197, 1953, p. 1525-1529.

Mechanism of strain hardening is discussed in connection with some recent observations on stress-induced motion of dislocation boundaries and on shear deformation of zinc, cadmium and copper crystals. Graphs. 17 ref. (Q24, Zn, Cd, Cu)

21-Q. Design Properties of Metals. II. Strength in Tension. Robert L. Stedfeld. *Machine Design*, v. 25, Nov. 1953, p. 161-170.

More effective use of tensile strength data. Graphs, photographs, table. 8 ref. (Q23)

22-Q. The Behavior of Metals Under Dynamic Loading. Donald S. Clark. *Metal Progress*, v. 64, Nov. 1953, p. 67-73.

Impact and strain propagation; dynamic stress-strain relations; delay of plastic strain; and pre-yield microstrain. Graphs, diagrams, table. (Q23)

23-Q. Effect of Iron on Hardness, Bend Properties and Welding of Titanium Sheet. W. J. Barth and A. L. Feild, Jr. *Metal Progress*, v. 64, Nov. 1953, p. 74-77.

Concludes that 0.5% iron has little effect on the room-temperature mechanical properties of commercial-purity alpha alloys such as RC-70, RS-70, Ti-100-A and MST Grade III, in the range of 55,000 to 70,000-psi. yield strength. Graphs, tables, photograph, micrographs.
(Q29, Q5, Q23, K general, Ti)

24-Q. Dislocations, Plastic Flow and Creep. N. F. Mott. *Royal Society, Proceedings*, v. 220, ser. A, Oct. 22, 1953, p. 1-14 + 4 plates.

Dislocations normally exist in crystalline solids; they are formed during crystal growth, and can move when the crystal is stressed. Theory of ductile fracture based on production of piled-up dislocations. The concept of "climb" of dislocations is introduced to explain recovery and creep. Diagrams, micrographs. 60 ref. (Q24, Q3, M26)

25-Q. Properties of Carbon and Alloy Steels Made With Sponge Iron. J. L. Morning and W. W. Stephens. *U. S. Bureau of Mines, Report of Investigations* no. 4975, Sept. 1953, 17 p.

Studies on the mechanical and physical properties of a series of steels. Tables. 7 ref.
(Q general, P general, Fe, CN, AY)

26-Q. (French.) **Determination of the Bursting Pressure of a Container From the Tensile Properties of the Metal.** Henri de Leiris and Paul Bastien. *Revue de métallurgie*, v. 50, no. 10, Oct. 1953, p. 683-696.

Use of Walmsley's theory for critical stress. Calculated and experimental data compared. Diagrams, tables. 11 ref. (Q23)

27-Q. (French.) **Relationship Between the Exact Shape of the Tensile Curve of Metals and the Simultaneous Modifications of Their Structure.** Ch. Crussard. *Revue de métallurgie*, v. 50, no. 10, Oct. 1953, p. 697-710.

Observations on polycrystals and monocrystals of various metals. Equations for predicting the elongation at which necking begins. New hypothesis on deformation bands. Tables, graphs, micrographs. 31 ref. (Q27)

28-Q. (French.) **Observations on Pieces Cracked or Broken in Service (Crankshafts, Helical Springs, Etc.)** Paul Coron. *Revue de métallurgie*, v. 50 no. 10, Oct. 1953, p. 711-724; disc., p. 724-726.

Microscopic observations of cracks and fractures of cast iron and steel pieces at ordinary temperatures from mechanical causes. Method for determining the cause and eliminating occurrence of service failures. Photographs. 133 ref. (Q26, CI, CN)

29-Q. (German.) **Novel X-Ray Diffraction Technique for Measuring Internal Stresses in Metals.** I. Szanto. *Acta Technica Academiae Scientiarum Hungaricae*, v. 7, nos. 1-2, 1953, p. 165-186.

A new method of testing steel has made attainable a degree of precision identical with current radiographic techniques, but by a much simpler measuring procedure. Tables, graph, photographs, diagrams. 15 ref. (Q25, ST)

30-Q. Metallurgical Topics. *Engineer*, v. 196, Nov. 6, 1953, p. 592-593.

Bend and tensile tests on steels and experiments on steel tubes under internal pressure. Graphs, tables. (Q5, Q27, ST)

31-Q. The Design of Creep-Resisting Steels. E. W. Colbeck, J. R. Rait and J. O. Ward. *Engineering*, v. 176, Oct. 23, 1953, p. 537-540.

Effects of various alloying elements. Diagram, photographs, tables, graphs. 28 ref. (Q3, AY)

32-Q. Influence of Section Size on the Strength Properties of Non-Ferrous Sand Castings. W. J. Reichenecker. *Foundry*, v. 95, Nov. 19, 1953, p. 627-628.

Includes graphs, table, diagram. (Q23)

33-Q. The Initiation of Brittle Fracture at Welded Joints in Steel Structures. W. G. Warren and H. G. Vaughan. *Institute of Welding, Transactions*, v. 16, Oct. 1953, p. 127-135.

Under certain conditions fissured weld metal can precipitate brittle fracture in a weldment. Results of an investigation of factors involved in fissuring; means of its minimization. Photographs, tables, diagrams. (Q26, K general, ST)

34-Q. How to Develop Favorable Stress Patterns. I. J. E. Campbell and H. O. McIntire. *Iron Age*, v. 172, Nov. 12, 1953, p. 185-188.

Favorable surface stresses can increase fatigue life and can be obtained by selection of proper steel grades, size and heat treatment. Graphs, tables. (Q25, J general)

35-Q. Martensite Bad Medicine for Drilling Lines. C. M. Zerr. *Oil and Gas Journal*, v. 52, Nov. 30, 1953, p. 79-80, 82, 84.

Not all wickering is a result of martensite. Other, correctable factors may be responsible. Photographs. (Q9, M27, CN)

36-Q. (English.) **Study on High Chromium Steels. I. On the Anomaly of Alpha Solid Solution of Fe-Cr System at High Temperatures.** Yonoshin Imai and Kenzaburo Kumada. *Science Reports of the Research Institutes, Tohoku University*, Series A, v. 5, no. 3, June 1953, p. 218-226.

Experimental study to determine cause of brittleness at 475° C. Graphs, tables. (Q23, AY)

37-Q. (English.) **On the Microhardness of Aluminium Single Crystal.** Takeo Hikage. *Science Reports of the Research Institutes, Tohoku University*, Series A, v. 5, no. 3, June 1953, p. 254-262.

Investigation on annealed aluminum before and after deformation by stretching. Graphs, diagrams, micrographs, tables. 5 ref.
(Q29, Q24, Al)

38-Q. Biaxial Fatigue Properties of Pressure Vessel Steels. C. E. Bowman and T. J. Dolan. *Welding Journal*, v. 32, Nov. 1953, p. 529s-537s.

Investigation to determine relative abilities of carbon and low alloy steels to resist cyclic loading with and without stress raisers imposed by design and fabrication. Graphs, photographs, diagrams, tables. 6 ref. (Q7, CN, AY)

39-Q. Transition Temperatures of Structural Steel Beams With Butt-Welded Splices. William J. Krefeld and George B. Anderson. *Welding Journal*, v. 32, Nov. 1953, p. 538s-576s.

Investigation of resistance of butt-welded and unwelded structural beams to impact loads at low winter temperatures. Relative behavior of semikilled and fully killed steels and low-hydrogen versus ordinary electrodes. Graphs, tables, diagrams, photographs. 3 ref. (Q6, K1, CN)

40-Q. A Survey of Embrittlement and Notch Sensitivity of Heat Resisting Steels. George Sachs and W. F. Brown. Paper from "Symposium on Strength and Ductility of Metals at Elevated Temperatures". American Society for Testing Materials, Technical Publication no. 128, p. 6-20; disc. p. 21-24.

Results of series of experiments. An attempt to determine general effects of important variables; to show relationship of the phenomena observed; and to suggest mechanism for the embrittlement. Graphs, table. 23 ref. (Q23, AY)

41-Q. Influence of Sharp Notches on the Stress-Rupture Characteristic of Several Heat-Resisting Alloys. W. F. Brown, Jr., M. H. Jones and D. P. Newman. Paper from "Symposium on Strength and Ductility of Metals at Elevated Temperatures". American Society for Testing Materials, Technical Publication no. 128, p. 25-45; disc., p. 46-48.

Stress-rupture tests carried out on a number of low alloy steels, ferritic stainless steels and austenitic alloys. Unnotched and sharply notched bars tested at various temperatures. Ductilities determined. Graphs, micrographs. 9 ref. (Q4, AY, SS)

42-Q. Effect of a Notch and of Hardness on the Rupture Strength of "Discaloy". F. C. Hull, E. K. Hann and H. Scott. Paper from "Symposium on Strength and Ductility of Metals at Elevated Temperatures". American Society for Testing Materials, Technical Publication no. 128, p. 49-58; disc., p. 58.

Creep-rupture and notched bar rupture tests conducted at 1000 and 1200° F. Plain bar rupture strength reached a maximum at a hardener content producing 2% rupture strain. Notched-bar strength exceeded plain bar strength in material in which creep specimen had more than 5% rupture strain. Diagrams, graphs, tables. (Q3, Q4, SS)

43-Q. Notch Rupture Tests of Inconel X and Nimonic 80A. D. E. Furman and A. M. Talbot. Paper from "Symposium on Strength and Ductility of Metals at Elevated Temperatures". American Society for Testing Materials, Technical Publication no. 128, p. 59-65.

Tests at 1100, 1350, and 1500° F. on Inconel "X" and at the two latter temperatures on Nimonic 80 A. Both materials were found to be insensitive to shallow, sharp notches at 1350° F., suggesting that accidental surface imperfections would have small effect on the service life of these alloys. Tables, graphs. 3 ref. (Q4, Ni)

44-Q. Effect of Notch Geometry on Rupture Strength at Elevated Temperatures. E. A. Davis and M. J. Manjoine. Paper from "Symposium on Strength and Ductility of Metals at Elevated Temperatures". American Society for Testing Materials, Technical Publication no. 128, p. 67-87; disc., p. 88-92.

Three series of creep-rupture tests of notch bars with varying geometry of the notch were performed at elevated temperatures on several heat resistant alloys. Effect on notch sensitivity of stress level, grain size, hardness, ductility and heat treatment investigated. Table, graph, micrograph. 9 ref.
(Q3, Q4, SS)

45-Q. Investigations Into the Influence of Notches on Creep Strength at High Temperatures. W. Siefried. Paper from "Symposium on Strength and Ductility of Metals at Elevated Temperatures". American Society for Testing Materials, Technical Publication no. 128, p. 93-130.

Investigations principally on austenitic steels as used in the construction of stationary gas turbines. Table, graphs, photographs, micrographs. 5 ref. (Q3, SS)

46-Q. Theory of Time-Dependent Rupture and Interpretation of Some Stress-Rupture Data. D. N. Frey. Paper from "Symposium on Strength and Ductility of Metals at Elevated

Temperatures". American Society for Testing Materials, Technical Publication no. 128, p. 131-137; disc., p. 138-141.

Effect of precipitation upon rupture time and ductility and effect of circumferential notches on elevated temperature rupture strength. Graphs, micrographs. 11 ref. (Q4)

47-Q. The Effect of Grain Size Upon the Fatigue Properties at 80°, 1200°, and 1600° F of "Precision Cast" Alloy X-40. P. R. Toolin. Paper from "Symposium on Strength and Ductility of Metals at Elevated Temperatures". American Society for Testing Materials, Technical Publication no. 128, p. 142-159; disc., p. 160-162.

Notch sensitivity of carefully ground notches was greater at 1200° F. than at either room temperature or 1600° F. Machined notches have higher fatigue strengths at room temperature and 1200° F. than carefully ground notches. Some tensile strengths are also reported. Tables, graphs, micrographs. 17 ref. (Q7, SS)

48-Q. Recovery and Creep in an Alloy Steel. H. A. Lequear and J. D. Lubahn. Paper from "Symposium on Strength and Ductility of Metals at Elevated Temperatures". American Society for Testing Materials, Technical Publication no. 128, p. 163-178; disc., p. 180-183.

Interrupted creep tests demonstrated recovery in Cr-Mo-V steel at 1000° F. but not at 800° F. Diagrams, graphs, photographs, table. 6 ref. (Q3, N4, AY)

49-Q. An Experimental Study of the Strength and Ductility of Steel at Elevated Temperatures. J. Glen. Paper from "Symposium on Strength and Ductility of Metals at Elevated Temperatures". American Society for Testing Materials, Technical Publication no. 128, p. 184-221; disc., p. 222-224.

Tests explain many effects of alloying elements on creep resistance and ductility of steels under various conditions. It was concluded that the factor largely determining such effects was precipitation. Graphs, tables. 14 ref. (Q23, Q3, N7, CN, AY)

50-Q. Effect of Sigma on Strength and Ductility of 25 Cr, 20 Ni Steel. G. V. Smith and E. J. Dulis. Paper from "Symposium on Strength and Ductility of Metals at Elevated Temperatures". American Society for Testing Materials, Technical Publication no. 128, p. 225-235; disc., p. 236.

Sigma causes moderate strengthening at room temperature, severe loss in toughness even at temperatures as high as 500° F., and moderate loss of creep-rupture strength at 1300° F. Tables, graphs, micrographs. (Q23, Q3, Q4, SS)

51-Q. The Structure and Properties of Stainless Steels After Exposure at Elevated Temperatures. A. B. Wilder and E. F. Ketterer. Paper from "Symposium on Strength and Ductility of Metals at Elevated Temperatures". American Society for Testing Materials, Technical Publication no. 128, p. 237-246; disc., p. 247-249.

A number of ferritic and austinitic stainless steels were exposed at temperatures of 900 to 1200° F. for periods up to 34 000 hr. Microstructure of the weld heat effected zone and parent metal and tensile and creep rupture properties of the parent metal. Diagram, tables, graphs, micrographs. 4 ref. (Q23, Q3, Q4, M27, SS)

52-Q. (German.) **The Creep Behavior of Zirconium-Alloyed Steels at 500 C.** Wilhelm Anton Fischer. *Archiv für das Eisenhüttenwesen*, v. 24, nos. 9-10, Sept.-Oct., 1953, p. 397-400.

Zirconium steels quenched at 1000 to 1200° C. and annealed at 600° C. shown to have a lower creep strength than other special carbide-forming steels. Tables, graphs. 13 ref. (Q3, AY)

53-Q. (German.) **A Mathematical Equation for the Stress-Strain Curve of the Tensile Test.** Alfred Krisch. *Archiv für das Eisenhüttenwesen*, v. 24, nos. 9-10, Sept.-Oct., 1953, p. 401-405.

Literature review and critical discussion and expansion by H. I. Fusfield's and H. Kostron's formulas to permit consideration of small tensile deformations. Tensile strength of unalloyed and alloyed steels. Tables, graphs. 19 ref. (Q27, CN, AY)

54-Q. (German.) **The Bending Yield Point, an Additional Characteristic of Thin Sheet Metals.** Walter Fackert. *Archiv für das Eisenhüttenwesen*, v. 24, nos. 9-10, Sept.-Oct., 1953, p. 407-410.

Critically discusses earlier tests of the suitability of sheet metals for the manufacture of containers. New testing device, its operation and results. Table, graphs, photographs, diagrams. 2 ref. (Q5)

55-Q. (German.) **Effect of Low-Temperature Deformation on the Properties of Stainless Austenitic Steels.** Karl Bungardt, Rudolf Oppenheim and Robert Scherer. *Archiv für das Eisenhüttenwesen*, v. 24, nos. 9-10, Sept.-Oct., 1953, p. 423-430.

Tests made to determine effects of low temperature (−70 and −180° C.) on mechanical properties, magnetic saturation and chemical resistance. Tables, graphs, micrographs. (Q general, P16, R general, SS)

56-Q. (Russian.) **Influence of Plastic Deformation Arising During the Decomposition of a Solid Solution on the Rate of Growth of the Nucleus of a New Phase.** L. N. Aleksandrov and B. Ia. Liubov. *Doklady Akademii Nauk SSSR*, v. 91, no. 3, July 21, 1953, p. 519-522.

Influence of stress state generated by transformation itself gives the process an auto-catalytic character. 7 ref. (Q24, N6)

57-Q. (Book.) **Analysis of Deformation.** K. Swainger. v. 1. 1953. Chapman & Hall, Ltd., 37-39 Essex St., London, W.C. 2, England. £3-5-0.

Formulation of mathematically linear theory analyzing deformation. Draws general inferences without solving equations and boundary conditions for particular cases. (Q24)

58-Q. (Book.) **Symposium on Strength and Ductility of Metals at Elevated Temperatures.** ASTM Special Technical Publication no. 128. 249 p. 1952. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $3.25.

Particular reference is made to effects of notches and metallurgical changes. Individual papers are separately abstracted. (Q23, Q3, Q4)

59-Q. (Book—German.) **(Technical Hardness Measurements) Technische Härtemessung.** Herbert von Weingraber. 374 p. 1952. Carl Hanser Verlag, Munich 27, Germany. DM.36.00.

Deals with all aspects of hardness testing of metals and nonmetals, including concept of hardness in materials technology, methods of testing, equipment, and applications. (Q29)

A.S.M. MIDWINTER MEETING

Hotel Statler

Boston, Mass.

March 4-5, 1954

R

Corrosion

1-R. Some Observations on the Mechanism of Pitting Corrosion. R. May. *Institute of Metals, Journal*, v. 82, Oct. 1953, p. 65-74.

Nature of corrosion products, causes and controlling factors using copper specimens. Diagrams. 1 ref. (R2, Cu)

2-R. Symposium on Control of Internal Corrosion of Tankers. I. The Nature of Corrosion and Its Control. William B. Jupp. **II. Inhibitors in Cargo.** J. V. C. Malcolmson, W. S. Quimby, Gwendolyn D. Pingrey and J. C. D. Oosterhaut. **III. Corrosion Control in Practice.** A. B. Kurz. *Corrosion*, v. 9, Nov. 1953, p. 387-410; disc., p. 410-424.

Tables, graphs, diagrams. 13 ref. (R general, CN)

3-R. Cable Sheath Corrosion and Prevention. B. B. Reinitz. *Corrosion*, v. 9, Nov. 1953, p. 425-430; disc., p. 431.

Causes of corrosion in lead sheaths and possibilities of prevention by means of cathodic protection and neoprene coverings. Photographs, diagrams, tables. 24 ref. (R1, R10, Pb)

4-R. Radiography as an Aid in Corrosion Studies. H. A. Liebhafsky and A. E. Newkirk. *Corrosion*, v. 9, Nov. 1953, p. 432-435.

X-ray technique used to determine corrosion on three types of stainless steel by ferric-chloride solution. Radiographs. (R11, SS)

5-R. Some Corrosion Hazards From DC Welding Currents. H. W. Wahlquist. *Corrosion (News Section)*, v. 9, Nov. 1953, p. 1.

Methods of connecting welding machines to large construction projects to eliminate or reduce corrosion or pitting on adjoining structures. Diagrams. (R1, K1)

6-R. Observations on Three Non-Tarnishing Ferrous Alloys. A. A. Krishman. *Journal of Scientific & Industrial Research*, v. 12, sec. A, Sept. 1953, p. 451-453.

Results of corrosion tests on iron-aluminum-manganese alloys. Micrographs, tables. (R11, Fe)

7-R. Three Accelerated Corrosion Tests for Materials and Finishes. Sam Tour. *Materials & Methods*, v. 38, Nov. 1953, p. 110-113.

Equipment and methods for making simulated service tests. Includes testing by alternate condensation, wear-corrosion and salt water. Photographs. (R11)

8-R. Structures in the Sea. M. B. Willey. *Petroleum Engineer*, v. 25, Nov. 1953, p. B38, B41, B43-B44, B47.

How wind, waves, and corrosion present special problems in design of offshore drilling platforms. Photographs. 7 ref. (R3, R4, ST)

9-R. Corrosive Action on Steel by Gases Dissolved in Water. J. Wade Watkins and Jack Wright. *Petroleum Engineer*, v. 25, Nov. 1953, p. B50-B51, B53, B55, B57.

Equipment corrosion in secondary recovery of petroleum shown to be accelerated by action of gases dissolved in injected water. Photograph, graphs, diagram. 8 ref. (R4, ST)

10-R. Oxides of Zirconium. (Digest of "The Corrosion of Zirconium", by

L. E. Colteryahn, W. Joseph, W. E. Ray and H. J. Read; *U. S. Atomic Energy Commission Report* NTO-837.) *Metal Progress*, v. 64, Nov. 1953, p. 124, 126.

Efforts to study the growth mechanisms of the corrosion products on zirconium. (R2, Zr)

11-R. (French.) Study of the Oxidation of High-Purity Iron and the Manner of Decomposition of the Monoxide Phase of Iron. R. Collongues, R. Sifferlen and G. Chaudron. *Revue de métallurgie*, v. 50, no. 10, Oct. 1953, p. 727-735; disc., p. 735-736.

Structure of oxide films. The role of impurities in the mechanism of oxidation. Various mechanisms of the decomposition of the iron oxide phase. Graphs, micrographs. 11 ref. (R2, Fe)

12-R. (German.) Corrosion of Lead. Dissolution as a Function of Time. W. Katz. *Metalloberfläche*, Ausgabe A, v. 7, no. 11, Nov. 1953, p. 161-166.

Results of experiments with neutral, acid and alkali solutions. Details of the experiments. Results compared with those from electrochemical measurements. Graphs, micrographs. 5 ref. (R2, Pb)

13-R. The Rate of Dissolution of Zinc and Cadmium in Chromic Chloride Solutions. Cecil V. King and Natalie Mayer. *Electrochemical Society, Journal*, v. 100, Nov. 1953, p. 473-479.

Experimental study of factors affecting the above, including form of chromic ion present, pretreatment of metal surface, and in some solutions, acidity. Graphs, table. 15 ref. (R6, Cd, Cr, Zn)

14-R. Corrosion. How Best to Study It. *Metal Progress*, v. 64, Dec. 1953, p. 100, 170, 172-174.

Includes "For More Fundamental Research"; John Chipman, and "A Defense of Ad Hoc Studies", Frank L. LaQue. Relative merits of fundamental and empirical studies. (R general)

15-R. Corrosion Tests for Liquid Metals, Fused Salts at High Temperatures. D. C. Vreeland, E. E. Hoffman, and W. D. Manly. *Nucleonics*, v. 11, Nov. 1953, p. 36-39.

Static and dynamic tests used to determine reactions between possible heat transfer and container materials for nuclear applications. (R11, T25)

16-R. Filiform Corrosion. M. Van Loo, D. D. Laiderman and R. R. Bruhn. *Paint, Oil & Chemical Review*, v. 116, Dec. 3, 1953, p. 20-22, 30-34.

Examples. Conditions conducive to filiform growth defined. Theoretical explanation involving initiating, driving, and directing mechanisms. Suggests improvements. Photographs, diagram, tables. (R1)

17-R. Progress Report on Development of a New Accelerated Corrosion Test. W. L. Pinner. *Plating*, v. 40, Dec. 1953, p. 1376-1378, 1383; disc., p. 1384.

Progress report of a committee project set up in 1951 by the AES. Table. (R11)

18-R. Corrosion Studies at the Institute. *Tin and Its Uses*, 1953, no. 29, p. 1-5.

Corrosion resistance of tin and its alloys to sea water and weathering conditions. Photographs. (R4, R3, Sn)

19-R. (German.) The Behavior of Alkali Hydrogen Fluorides. The Hydrogen Fluoride Mixture "WB." in the Presence of Iron. Bruno Schulze. *Werkstoffe und Korrosion*, v. 4, no. 10, 1953, p. 349-356.

Experiments and results on corrosive effects of potassium acid fluoride and ammonium acid fluoride on iron at 20 and 80° C. Graphs, photographs, tables. 12 ref. (R6, Fe)

20-R. (Italian.) Electrode Polarization and Its Utilization in the Evaluation of Inhibitors. G. Bombara. *Rivista dei Combustibili*, v. 7, no. 9, Sept. 1953, p. 527-546.

Causes of electrochemical differentiation of a metallic surface into anodic and cathodic areas. Diagrams, graphs. 6 ref. (R10)

21-R. (Russian.) Photographically Active Particles Evolved by Metals During Atmospheric Corrosion. I. L. Roikh and D. M. Rafalovich. *Doklady Akademii Nauk SSSR*, v. 90, no. 4, June 1, 1953, p. 603-606.

Metals liberate molecules of hydrogen peroxide in the course of atmospheric corrosion. Graphs. 7 ref. (R3)

22-R. (Russian.) Influence of Temperature on Rate of Corrosion of Aluminum and Certain Aluminum Alloys. G. V. Akimov and V. V. Romanov. *Doklady Akademii Nauk SSSR*, v. 91, no. 2, July 11, 1953, p. 281-283.

Tests on aluminum-copper alloys, aluminum-magnesium alloys and commercially pure aluminum. Graphs. 3 ref. (R general, Al, Cu, Mg)

23-R. (Russian.) New Principle in the Investigation of Atmospheric Corrosion of Metals. I. L. Rozenfel'd and T. I. Pavlutskaia. *Doklady Akademii Nauk SSSR*, v. 91, no. 2, July 11, 1953, p. 315-317.

Hypothesis on the possibility of the existence of corrosion elements having considerable differences in potential. Graphs. 2 ref. (R3)

24-R. (Russian.) Kinetics of High-Temperature Oxidation of Selenium-Bearing Copper. N. P. Diev, M. J. Kochnev, A. F. Plotnikova and T. N. Zaidman. *Zhurnal Prikladnoi Khimii*, v. 26, no. 6, June 1953, p. 596-604.

Addition of selenium to copper alloys increases the oxidation rate in the temperature range of 600-1000° C. Diagrams, graphs, tables. 12 ref. (R2, Cu)

25-R. (Russian.) Corrosion of Iron in Contact With Gasoline or Kerosene and With an Aqueous Solution of an Electrolyte Containing Potassium Chromate Additives. I. V. Krotov and T. M. Khachadurova. *Zhurnal Prikladnoi Khimii*, v. 26, no. 6, June 1953, p. 605-611.

Potassium chromate can be used as a corrosion inhibitor only when the water phase is a very weak electrolyte. Tables, graphs. 6 ref. (R10, Fe)

26-R. (Russian.) Factors Influencing the Rusting of Precision Steel Parts During Manufacturing Process. V. V. Skorchelletti and V. E. Piskorskii. *Zhurnal Prikladnoi Khimii*, v. 26, no. 7, July 1953, p. 730-735.

Influence of relative humidity, temperature, and contact with air containing SO_2 on rate of rust spot generation was demonstrated by laboratory experiments. Graphs. (R3, ST)

27-R. (Book.) Cathodic Protection of Pipelines and Storage Tanks. V. A. Pritula. 1953. Her Majesty's Stationery Office, London, England. 10s. 6d.

Translated from the Russian. Deals with theory of the subject and practical details on methods. (R10, CN)

S
Inspection and Control

1-S. Cost Reduction Through Electronic Production Control. R. G. Canning. *Mechanical Engineering*, v. 75, Nov. 1953, p. 887-890.

Possibility of using an electronic system to take over many routine clerical operations and assist in non-routine operations. Diagrams. 3 ref. (S18)

2-S. An Electronic Thickness Gage. Abner Brenner and Jean Garcia-Rivera. *Plating*, v. 40, Nov. 1953, p. 1238-1243; disc., p. 1244.

Design, operation and applications of instrument for measuring thickness of coatings on metals provided the conductivities of coating and basis metal differ sufficiently. Graphs, diagrams, photographs. 6 ref. (S14)

3-S. Thickness of Electrodeposited Coatings by the Anodic Solution Method. C. F. Waite. *Plating*, v. 40, Nov. 1953, p. 1245-1248; disc., p. 1253-1254.

Technique and applications. Advantages in certain instances over drop test or magnetic methods. Diagrams, table. (S14, L17)

4-S. Testing Organic Finishes and Interpretation of Results. C. O. Hutchinson. *Plating*, v. 40, Nov. 1953, p. 1255-1266; dis., p. 1266-1268.

Over 60 properties of organic finishing materials as a basis for evaluating coatings. Lists standard tests for most of these properties. Tables. 141 ref. (S22)

5-S. Utility of Isotopes in Metallurgy. Henry C. Boynton and A. D. Kirshenbaum. *Steel*, v. 133, Nov. 9, 1953, p. 130-133.

Tracer elements were found to be valuable shortcut in quantitative analysis of oxygen in such metals as iron, steel and copper. Diagrams, tables. (S19, S11, CI, ST, Cu)

6-S. Product Specifications. Magnesium Alloys. *Welding Engineer*, v. 38, Nov. 1953, p. 51.

Data sheet presents cross references to various manufactures, federal and society specifications. (S22, Mg)

7-S. (French.) Statistical Control. Some Methods Applicable to Welded Construction. G. d'Herbemont. *Soudure et Techniques connexes*, v. 7, no. 9-10, Sept.-Oct. 1953, p. 242-250.

Three groups of methods for determining causes of quality variation. Proposes plan and analysis of variance capable of serving as a basis for tests on quality of weldments. Tables, graphs. (S12, K general)

8-S. The Open-Circuit Thermocouple. Richard D. Potter. *Metal Progress*, v. 64, Nov. 1953, p. 80-81.

Measurement of temperature by spot welding the thermocouple wires to the sample being studied in such a way as to make the specimen a part of the junction of the thermocouple. (S16)

9-S. Ten Practical Uses of Statistical Quality Control in Metallurgical Plants. *Metal Progress*, v. 64, Nov. 1953, p. 82-88.

Uses to obtain quality assurance, customer standards, operator interest and tolerances for machines and methods. Examples of uses in production of articles from aluminum sheet. Photographs, diagrams, quality control form. (S12, Al)

10-S. Statistical Quality Control at Detroit's Ternstedt Division. Bryant W. Pocock. *Products Finishing*, v. 18, Nov. 1953, p. 24-32, 34, 36, 38, 40, 42.

Adoption of quality control and procedure for putting it into practice for pinpointing operations causing defective copper plated products. Photographs, graphs. (S12, L17, Cu)

11-S. Thermocouples for 3400° F. Temperatures. (Digest of "High-Temperature Thermocouples" by H. A. Wilhelm, H. J. Svec, A. I. Snow and A. H. Danne; *U. S. Atomic Energy Commission Report* AECD-3275.) *Metal Progress*, v. 64, Nov. 1953, p. 134, 136, 138.

Previously abstracted from original. See item 519-S, 1952. (S16)

12-S. Betatron and Isotope Radiography. A. von Arx. *Brown Boveri Review*, v. 40, no. 8, Aug. 1953, p. 289-295.

Limits of application of radioisotopes, X-ray apparatus, and betatrons and their respective advantages and disadvantages. Radiographs, photographs, diagrams. 4 ref. (S19)

13-S. Non-Destructive Testing of Brown Boveri Products by Gamma-Radiography. A. Lüthy. *Brown Boveri Review*, v. 40, no. 8, Aug. 1953, p. 296-304.

Determination and location of internal faults in cast and welded machine parts. Radiographs, photographs. (S13)

14-S. A Method of Metallurgical Microspectroscopy. Ford R. Bryan and Cleo H. Neveu. *Metal Progress*, v. 64, Dec. 1953, p. 82-85.

Techniques, equipment and applications of method for identifying microconstituents of metallurgical specimens. Photographs. (S11, M27)

15-S. Some Applications of Statistical Analysis in the Steel Industry. John W. W. Sullivan. *Metal Progress*, v. 64, Dec., 1953, p. 91-96, 97-98.

Ways in which test and production data can be used to establish controls of product variability. (S12)

16-S. Canadian Plan for Birthmarking Steels. *Steel*, v. 133, Nov. 16, 1953, p. 119, 122.

Cold finished shapes are identified by ink stamping, hot rolled shapes are identified by indentation stamping. Both are supplemented by standard color code prepared for 24 subgroups. (S10, ST)

17-S. Gaging With Activated Neutrons. H. V. Watts and L. Reiffel. *Steel*, v. 133, Nov. 23, 1953, p. 110-111.

Beta-ray gaging of silver plating on radar waveguides. Photographs. (S14, Ag)

18-S. (German.) **Sheet-Metal Thickness Measuring Instruments, Especially for Measuring Thicknesses of Rolled Strip. I. Induction and X-Ray Measuring Instruments.** N. de Ball. *Archiv für technisches Messen*, 1953, no. 213, Oct., p. 219-222.

Diagrams, photographs. (S14)

19-S. (German.) **New Methods of Measuring Temperature in Iron and Steel Industry. I. Measuring Temperature With Thermocouples.** Fritz Lieneweg. *Archiv für technisches Messen*, 1953, no. 213, Oct., p. 231-232.

Use of thermocouples with and without graphic recorders. Photograph, diagram. 39 ref. (S16, ST, Fe)

20-S. (Polish.) **New Structural Steels.** Tadeusz Malkiewicz. *Hutnik*, v. 20, no. 10, Oct. 1953, p. 203-207 + data sheet.

New standards for common carbon steels of ordinary and increased strength. Alloyed structural steels, designation of steels and advantages from introduction of new standards. Tables. (S22, AY)

21-S. (Book.) **American Standard Specifications for Cast Iron Pipe Centrifugally Cast in Metal Molds for Gas.** 20 p. 1953. American Standards Association, 70 East 45th St., New York 17, N. Y.

Definitions, descriptions, quality control, records, marking, inspection, variation tolerances, cleaning and inspecting, testing, exterior coatings, rejection criteria, standard dimensions, thicknesses, diameters, and weights. (S22, T27, E14, CI)

22-S. (Book.) **American Standard Specifications for Cast Iron Pipe Centrifugally Cast in Metal Molds for Water and Other Liquids.** 17 p. 1953. American Water Works Assoication, 521 Fifth Ave., New York 17, N. Y. $0.40.

Definitions, descriptions, casting methods, quality, variation tolerances, cleaning and inspecting, testing, linings, exterior coatings, rejection procedure, standard thicknesses, diameters, and weights. (S22, T27, E14, CI)

23-S. (Book.) **American Standard Specifications for Cast Iron Pipe Centrifugally Cast in Sand-Lined Molds for Gas.** 23 p. 1953. American Standards Association, 70 East 45th St., New York 17, N. Y.

Definitions, descriptions, quality, records, marking, inspection, tolerances of variations, cleaning, weighing, exterior coatings, tests, rejection criteria, standard dimensions, thicknesses, and weights. (S22, T27, E14, CI)

24-S. (Book.) **American Standard Specifications for Cast Iron Pipe Centrifugally Cast in Sand-Lined Molds for Water or Other Liquids.** 22 p. 1953. American Water Works Association, 521 Fifth Ave., New York 17, N. Y. $0.45.

Definitions, descriptions, casting and quality, records, inspection, tolerances of variations, cleaning and inspecting, linings, exterior coatings, tests, rejection criteria, standard dimensions, standard thicknesses, diameters, and weights. (S22, T27, E14, CI)

25-S. (Book.) **American Standard Specifications for Cast Iron Pit Cast Pipe for Gas.** 18 p. 1953. American Standards Association, 70 East 45th St., New York 17, N. Y.

Descriptions, casting practices, quality, records, marking, inspection, weighing, exterior coatings, standard thicknesses, and weights. (S22, T27, E11, CI)

26-S. (Book.) **American Standard Specifications for Cast Iron Pit Cast Pipe for Water or Other Liquids.** 22 p. 1953. American Water Works Association, 521 Fifth Ave., New York 17, N. Y. $0.45.

Complete specifications for quality, inspection procedure, cutting, cleaning, testing, weighing, standard dimensions, thicknesses, and weights. (S22, T27, E11, CI)

27-S. (Book.) **American Standard Specifications for Cement Mortar Linings for Cast Iron Pipe and Fittings.** 5 p. 1953. American Water Works Association, 521 Fifth Ave., New York 17, N. Y. $0.35.

Characteristics of cement, sand, accepted specifications, water, preparation, application, thickness, curing of cement linings, exterior coatings, and testing of bituminous coatings. (S22, L26, CI)

28-S. (Book.) **American Standard Specifications for Short-Body Cast Iron Fittings, 3 Inch to 12 Inch, for 250-PSI Water Pressure Plus Water Hammer.** 8 p. 1953. American Water Works Association, 521 Fifth Ave., New York 17, N. Y. $0.35.

Description, casting, quality, records, marking, inspection, tolerance variations, cleaning and inspecting, weighing, tests and dimensions. (S22, T27, E general, CI)

29-S. (Book.) **1952 Book of ASTM Standards, Including Tentatives. Part I. Ferrous Metals.** 1572 p. **Part 2. Nonferrous Metals.** 1327 p. 1953. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Contains 500 specifications. Describes methods of testing. (S22, Q general)

30-S. (Book.) **Radioactive Isotopes.** W. J. Whitehouse and J. L. Putman. 424 p. 1953. Clarendon Press, Oxford, England. 50s.

Of interest to the metallurgist are sections on self-diffusion; friction and lubrication; and microradiography. (S19, N1, Q9, M23, Eg-h)

31-S. (Book.) **Temperature Measurement in Engineering.** v. 1. H. Dean Baker, E. A. Ryder and N. H. Baker. 179 p., 1953. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $3.75.

Design, performance, and operation of various installations, particularly thermocouple technique. (S16)

T

Applications of Metals in Equipment

1-T. Magnesium Alloy and the Printer. R. S. Cox and R. V. Cannon. *Electrotypers and Stereotypers, Journal*, v. 18, Oct. 1953, p. 300, 303.

British-made "Primag" is now available as alternative to copper and zinc for photoengraving. Table. (T9, Mg)

2-T. Tests of Fittings on Insulated Aluminum Cable. Joel Tompkins and E. K. Lanctot. *Power Apparatus and Systems*, 1953, no. 8, Oct., p. 865-873; disc., p. 873-874.

Aluminum fittings and cables were found to be satisfactory if properly designed. Test procedures. Photographs, graphs, diagrams. (T1, Al)

3-T. New Planes Need More Titanium. *Aviation Week*, v. 53, Nov. 23, 1953, p. 22.

Effect on the future design requirements in the aircraft industry if light metal output should fail. (T24, Ti)

4-T. Waffles Stiffen Highspeed Structures. Irving Stone. *Aviation Week*, v. 53, Nov. 23, 1953, p. 38, 40, 43.

Makeup of waffle-type integrally stiffened panels used in tests on high-speed aircraft. Photographs, graphs. (T24)

5-T. Nuclear Physics and Metals. L. G. Cook. *Chemistry in Canada*, v. 5, Nov. 1953, p. 236-238.

Special requirements of the nuclear chemist for metals and how they may be met. Problems involved in handling uranium, plutonium and other rare earth metals. Tables, graphs. (T25, U, Pu)

6-T. Metallurgical Aspects of the Development of Small Gas Turbines. W. L. Slosson. *Journal of Metals*, v. 5, Nov. 1953, p. 1419-1426.

Brief description of construction and operation principles of Model 502 turbine. Configuration of turbine illustrated and basic operation diagram outlining airflow, operating temperatures and component speeds given. Photographs, diagram, tables. (T25)

7-T. Which Grade of Carbide Should You Use? Guy Monacelli. *Machine and Tool Blue Book*, v. 49, Nov. 1953, p. 162-166, 168, 170.

Various available Carboloy grades and their advantages and applications as cutting tools. Photographs, tables. (T6, W)

8-T. High Capacity Magnesium Dry Cells. R. C. Kirk, P. F. George and A. B. Fry. *Magnesium*, 1953, Nov. p. 10-13.

Composition, characteristics and capacity. (T1, Mg)

9-T. Die Materials for Limited Production Runs. John L. Everhart. *Materials & Methods*, v. 38, Nov. 1953, p. 92-95.

Properties, characteristics and applications of dies made from zinc-base alloys, antimonial lead, bismuth-base alloys, hardwood (maple),

densified wood, reconstituted wood and cast phenolic plastics. Table, photographs. (T5)

10-T. Specialized Propeller Production. *Metal Industry*, v. 83, Oct. 23, 1953, p. 335-338.

Equipment, plant layout and operating procedures of foundry engaged almost exclusively in production of ships' propellers. Photographs. (T22)

11-T. Body Engineers Technical Convention. James R. Custer. *Automotive Industries*, v. 109, Dec. 1, 1953, p. 48-49, 106.

Plastic dies, reinforced plastic bodies, aluminum die castings, air conditioning and other timely developments. Graphs. (T21, Al)

12-T. Printing Metals. II. Leslie G. Luker. *British Printer*, v. 66, Nov.-Dec., 1953, p. 48-51.

Stereo and electro-backing alloys, and problems of impurities, remelting and reviving. Photographs. (T9)

13-T. Cast Iron Process Vessels. H. P. Voznick. *Chemical Engineering Costs Quarterly*, v. 3, Oct. 1953, p. 97-111.

Application and advantages of cast iron for covers, jackets, heaters and agitators. Example of cost estimation. Photographs, tables, graphs. (T29, CI)

14-T. The Use of Steel Sheet for the Construction of Shielded Rooms. A. M. Intrator. *Communication and Electronics*, 1953, Nov., p. 599-604; disc., p. 604-605.

Principles of shielding. Details of design and construction for rooms to be used in making low-level electronic or electrical measurements. Photographs, diagrams, graphs. 3 ref. (T26)

15-T. Metallurgical Light on Aircraft Heater Failures. *Metal Progress*, v. 64, Dec. 1953, p. 136, 138, 140.

Digested from "Metallurgical Aspects of Aircraft Heaters", *Aircraft Heating Digest*, v. 3, no. 1, Aug. 1952, Surface Combustion Corp. (T27, R general, Q general, SS, Ni)

16-T. Rigidized Metals for Architectural Applications. *Sheet Metal Worker*, v. 45, Nov. 1953, p. 54-55, 108.

Development of sheet metals with increased strength and rigidity. Characteristics, applications and cost. Photographs. (T26)

17-T. High-Heat Influence on Aircraft Design. DC-7 Uses Titanium on Nacelle Structure. E. H. LaBombard. *Western Metals*, v. 11, Nov. 1953, p. 45-48.

Problems encountered due to increased operating temperatures of high-speed airplanes. Photographs, graphs, diagram. (T24, Q general, Ti)

V

Materials

General Coverage of Specific Materials

1-V. The Platinum Group Metals. *Metal Treatment and Drop Forging*, v. 20, Oct. 1953, p. 472-478.

Discovery and sources of platinum ores, physical properties, corrosion resistance, effect of heating in air, electrical resistance and thermoelectric and catalytic properties. Tables, graphs. (EG-c)

2-V. High Purity Metals. Daniel J. Maykuth. *Product Engineering*, v. 24, Nov. 1953, p. 186-190.

Mechanical and physical properties of highly refined Zn, Al, Fe, Mo, Cr, Ti and Zr have led to new and often unexpected applications. Tables, charts, photographs. 4 ref. (P general, Q general, T general, Zn, Al, Fe, Mo, Cr, Ti, Zr)

3-V. Recent Advances in Light Alloys. F. A. Fox. *Australasian Engineer*, 1953, Sept. p. 56-65.

Review covering production, alloy development, properties and uses. Photographs, graph, table. (Al, Mg, Be, Ti, EG-a)

4-V. Programs Underway to Increase U. S. Production of Strategic Beryllium. B. H. Clemmons and James S. Browning. *Journal of Metals*, v. 5, Nov. 1953, p. 1433-1434.

Occurrence, production and consumption, uses and processing of beryllium. (Be)

5-V. Malleable Irons. *Materials & Methods*, v. 38, Nov. 1953, p. 137.

Tabulates composition, properties and uses of pearlitic, standard 32510 and standard 35018 malleable irons. (P general, Q general, T general, CI)

6-V. (Polish:) Resistance Strips of Inmet Alloy. Z. Misiolek. *Prace Instytutow Ministerstwa Hutnictwa*, v. 5, no. 3, 1953, p. 119-122.

Methods for melting, casting, hot and cold working and heat treating. Inmet alloy strips met all requirements for resistance materials and are suitable for precision resistors. Tables, graphs. 3 ref. (SG-q, Cu, Mn, Ni, Fe, Al)

7-V. Silvaloy 355 (Silver Brazing Alloy). *Alloy Digest*, no. Ag-1, Dec. 1953.

Composition, physical constants, joint design, fluxing, brazing and applications. Tables. (T5, Ag)

8-V. Aluminum 62S (Age Hardenable, Structural, Wrought Aluminum Alloy). *Alloy Digest*, no. Al-11, Dec. 1953.

Composition, physical constants, properties, heat treatment, machinability, weldability, workability, corrosion resistance, general characteristics and applications. Tables. (Al)

9-V. Bridgeport 712 (Aluminum-Silicon Bronze). *Alloy Digest*, no. Cu-13, Dec. 1953.

Composition, physical constants, properties, heat treatment, machinability, weldability, corrosion resistance and general characteristics. Tables. (Cu)

10-V. U.S.S. A-R Steel (Abrasion Resisting Steel). *Alloy Digest*, no. SA-13, Dec. 1953.

Composition, machinability, workability, weldability, corrosion resistance, general characteristics and applications. Tables. (AY)

11-V. Unicut (High Speed Steel, M-3 Type 1). *Alloy Digest*, no. TS-14, Dec. 1953.

Composition, properties, heat treatment, workability, joining, machinability, general characteristics and applications. Tables. (TS)

12-V. Cascade (Precipitation Hardening Die Steel). *Alloy Digest*, no. TS-15, Dec. 1953.

Composition, physical constants, properties, heat treatment, machinability, weldability, general characteristics, forms available and applications. Tables. (AY, TS)

13-V. Zamak-3 (Zinc Die Casting Alloy). *Alloy Digest*, no. Zn-1, Dec. 1953.

Composition, physical constants, properties, castability, workability, machinability, weldability, heat treatment, corrosion resistance and general characteristics. Tables. (Zn)

14-V. Hafnium. J. Lomas. *Canadian Mining Journal*, v. 74, Nov. 1953, p. 80-81.

Discussion of discovery and properties. (Hf)

15-V. Free-Cutting Brass. *Copper & Brass Bulletin*, 1953, Nov., no. 166, p. 8-9.

(Continued on p. 55)

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POWDER METALLURGIST: Available immediately for responsible position in research, development, processing, production or sales. Extensive supervisory experience in all phases of powdered metallurgy. Degree, married, will relocate. Box 1-75.

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METALLURGIST: B.S. degree, age 28, married, one child. Four and one half years experience with aluminum alloys including foundry research, die casting, customer complaint work, service engineer, foundry problems, radiographic inspection. Some experience in steel heat treatment. Familiar with aluminum fabrication problems and processes and excellent knowledge of magnesium and bronze casting alloys. Desires responsible position in production. Location preference, Ohio or New Jersey. Box 1-105.

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METALLURGIST: Stainless and alloy steels. Age 42. Twenty years experience in production, processing, fabrication, development, research, modernization of facilities and methods, quality control, sales engineering and customer service. Outstanding record of achievement. Proven administrator. Now in responsible position, desires new connection with progressive company. Excellent references. Box 1-110.

METALLURGIST: B.S. degree, age 27, married, four children. Six years experience with aluminum foundries, secondary aluminum smelter and commercial laboratory, production metallurgist, production scheduler and shift superintendent of production. Desires affiliation with company offering responsible and challenging position. Location immaterial. Box 1-115.

METALLURGIST-CHEMIST: B.S. degree in chemistry. Age 26, married, veteran, one child. Five years experience in ferrous metallurgy which includes research laboratory experience, assistant plant metallurgist position, and production experience on ordnance 155 MM. shell production. Desires metallurgical position with opportunity of expanding metallurgical background. Box 1-120.

METALLURGIST: Thirty-five years drop forge experience in all types of equipment and materials. Experienced as machinist, toolmaker, quality control manager, has set up forging plant and machining plant acting as consultant. Domestic or foreign location, widower, free to travel. Best references. Age 59, health excellent, no loss of time due to sickness in over 28 years. Box 1-125.

METALLURGIST: B.S. and M.S. degrees in metallurgical engineering. Registered professional engineer. Age 35, married, two children, veteran. Sound background in ferrous metallurgy, ten years experience in welding, forging, machining, heat treating, and foundry fabrication problems. Experience includes research work and technical report writing. Desires position in production or research with advancement opportunity. Box 1-130.

Wanted to Buy

Back Volumes of Periodicals, A.S.M. Transactions. Wanted to Buy for Cash. Ashley, 24 E. 21 St., New York City.

METALLURGIST (Ferrous)

Age to 35. Position requires some experience in foundry, heat treating, X-ray, and plating process metallurgy. B.S. degree in metallurgy preferred. Good opportunity for advancement. Please reply stating education, experience and references, expected salary, and residence telephone number. Attach recent snapshot or photograph. Address reply to: Industrial Relations Dept., Nordstrom Valve Division of the Rockwell Manufacturing Co., 2431 Peralta St., Oakland 7, Calif.

WORKS METALLURGIST

For ball and roller-bearing company, located on Long Island Sound within one hour of New York City. Experience of more than five years should include at least two years with steel mill on alloy and tool-steels. Challenging opportunity for man who has initiative and imagination in solving the variety of problems met with in metalworking and finishing precision tool-steel products.

Metals Review

Box 1-10

METALLOGRAPHIST

Wanted for prominent New England industrial laboratory, preferably individual with practical experience on steels and nonferrous alloys. Advise age, training, experience and compensation desired. Box 1-5, Metals Review.

METALLURGICAL ENGINEERS

Outstanding opportunity for development work in all the engineering phases of metallurgy. Fabrication of new alloys involving all known techniques of melting and casting, welding, heat treatment, protective coatings, cermets, etc. No production work. Ideal location in the midwest. B.S. required, no experience necessary, prefer applicants under 30.

Box 1-15, Metals Review

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METALLURGICAL ENGINEER

Opportunity for young metallurgical engineer with midwestern manufacturer. Work involves research and development in the application and utilization of metals in glass forming and related operations. Experience and interest in nonferrous metals, powder metallurgy and ceramics beneficial. Industrial experience helpful, but not necessary. Apply Box 1-20, Metals Review.

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(*Continued from p.* 53)

Composition, machinability, workability, advantages and applications. Photographs, table. (Cu)

16-V. Aluminum Sand Casting Alloys. F. M. Howell and H. S. Jerabek. *Metal Progress,* v. 64, Dec. 1953, p. 96B.

Data sheet gives compositions, properties and designations of American commercial alloys. (S22, Al)

17-V. The Metallurgical and Other Industrial Applications of Manganese and Its Ores. R. A. Dodd. *South African Mining and Engineering Journal,* v. 64, pt. 2, Oct. 10, 1953, p. 205, 207.

Occurrence, composition and classification of manganese ores. Utilization of 90% of world production of manganese ore by steel industry is reported.
(T general, A4, B10, Mn)

18-V. Ductile Iron as Die & Mold Castings Offers Hardening, Welding, Machinability Advantages. Morris Asimow. *Western Metals,* v. 11, Nov. 1953, p. 50-53.

Composition, microstructure and desirable characteristics. Photographs, graph. (CI)

19-V. (Book.) **The Metallurgy of the Rarer Metals.** 156 p. 1953. The Institution of Metallurgists, 4 Grosvenor Gardens, London S.W.1, England. 15s. 6d.

A series of eight lectures, covering 17 metals as follows: Uranium, by L. Rotherham; Beryllium, by B. A. Scott; Molybdenum, by L. Northcott; Tungsten, by I. Jenkins; Titanium and Zirconium, by J. W. Rodgers; Tantalum and Niobium, by J. C. Chaston; Chromium and Manganese, by E. A. G. Liddiard; Platinum Group, by E. C. Rhodes. Discusses occurrence, extraction, physical and chemical properties, and applications. (EG-b)

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HARDENING 185-10 (Granular)	820°F.	1000-1500°F.

A Neutral Hardening Bath having a specific weight of 135 lbs. per cubic foot at 1500° F. (2.17 sp. gr.); specific heat 0.208 at 1050° F.

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3. *Spheroidizing of steel.*
4. *Descaling by use of higher percentage of additive to react with scale.*

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A water soluble neutral hardening bath having a specific weight of 110 lbs. per cubic foot at 1550° F. (1.70 sp. gr.); specific heat 0.165 at 1275° F.

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A Neutral Hardening Bath for higher temperature work, having a specific weight of 1.57 lbs. per cubic foot at 1850° F. (2.43 sp. gr.); specific heat 0.169 at 1550° F.

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3. *Annealing Beryllium Copper.*
4. *Bright hardening of steels and stainless steels.*
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A Neutral Salt Bath for tool steels, high speed steels, high carbon high chrome or air hardening steels having a specific weight of 140 lbs. per cubic foot at 1500° F. (Approx. 2.20 sp. gr.); specific heat 0.170 at 1500° F.

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